



Nevada and Northeastern California Greater Sage-Grouse

Proposed
Land Use Plan Amendment and
Final Environmental Impact Statement

Volume III: Chapters 5, 6, 7, and 8

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Chapter 5

Cumulative Effects

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Changes to Chapter 5 between draft and final EIS:

- Incorporated GRSG Cumulative Effects Analysis at the WAFWA Management Zone (landscape) level, which was based on most recent science;
- Updated cumulative effects analysis to reflect the Proposed Plan; and
- Updated reasonably foreseeable future actions table to reflect current status of ongoing and pending projects.

CHAPTER 5

CUMULATIVE IMPACTS

This section presents the likely cumulative impacts on the human and natural environment that could occur from implementing the alternatives presented in **Chapter 2**, Alternatives. This section is organized by topic, similar to **Chapters 3 and 4**, Affected Environment and Environmental Consequences.

The CEQ defines a cumulative impact as *the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.* Cumulative impacts in this context are effects on the environment that could result from implementing any individual actions associated with one of the Nevada and Northeastern California Greater Sage-Grouse LUPA/EIS alternatives, when combined with other individual actions not part of this plan, either within the planning area or outside of it. Cumulative impact analysis is required by CEQ regulations because environmental conditions result from many different factors that act together.

5.1 GREATER SAGE-GROUSE CUMULATIVE EFFECTS ANALYSIS: NEVADA AND NORTHEASTERN CALIFORNIA SUB-REGION

This cumulative effects analysis (CEA) discloses or estimates the long-term effects on Greater Sage-Grouse (GRSG) and its habitat from implementing each LUPA/EIS alternative, in conjunction with other past, present, and reasonably foreseeable future actions. In accordance with Council of Environmental Quality guidance, cumulative effects need to be analyzed in terms of the specific resource and ecosystem being affected (Council on Environmental Quality 1997b). As discussed in Chapter 1, the purpose for the proposed federal action is to identify and incorporate appropriate conservation measures to conserve, enhance, and restore GRSG habitat by reducing, eliminating, or minimizing threats to GRSG habitat. The Western Association of Fish and Wildlife

Agencies (WAFWA) delineated seven sage-grouse management zones based on populations within floristic provinces (Stiver et.al. 2006). Therefore, the cumulative effects analysis area for GRSG extends beyond the Nevada and Northeastern California Sub-region boundary and incorporates WAFWA Management Zones (MZs) III, IV, and V. MZs III, IV, and V contain all or portions of six BLM and Forest Service LUPA/RMPA planning areas and sub-regions. This includes the Nevada and Northeastern California Sub-region, the Utah Sub-region, the Oregon Sub-region, the Idaho and Southwestern Montana Sub-region, and small portions of the Lewistown and Wyoming Greater Sage-Grouse (9-Plan) planning areas.

As indicated in the Draft EIS, the CEA for the Final EIS includes quantitative analysis where possible. The analysis of BLM and Forest Service actions in MZs III, IV, and V is primarily based on MZ-wide datasets developed by the BLM National Operations Center (NOC). Where quantitative data are not available, analysis is qualitative. This analysis includes past, present, and reasonably foreseeable future actions for all land ownerships in the MZ, and evaluates the impacts of the Nevada and Northeastern California LUPA, by alternative, when added to those.

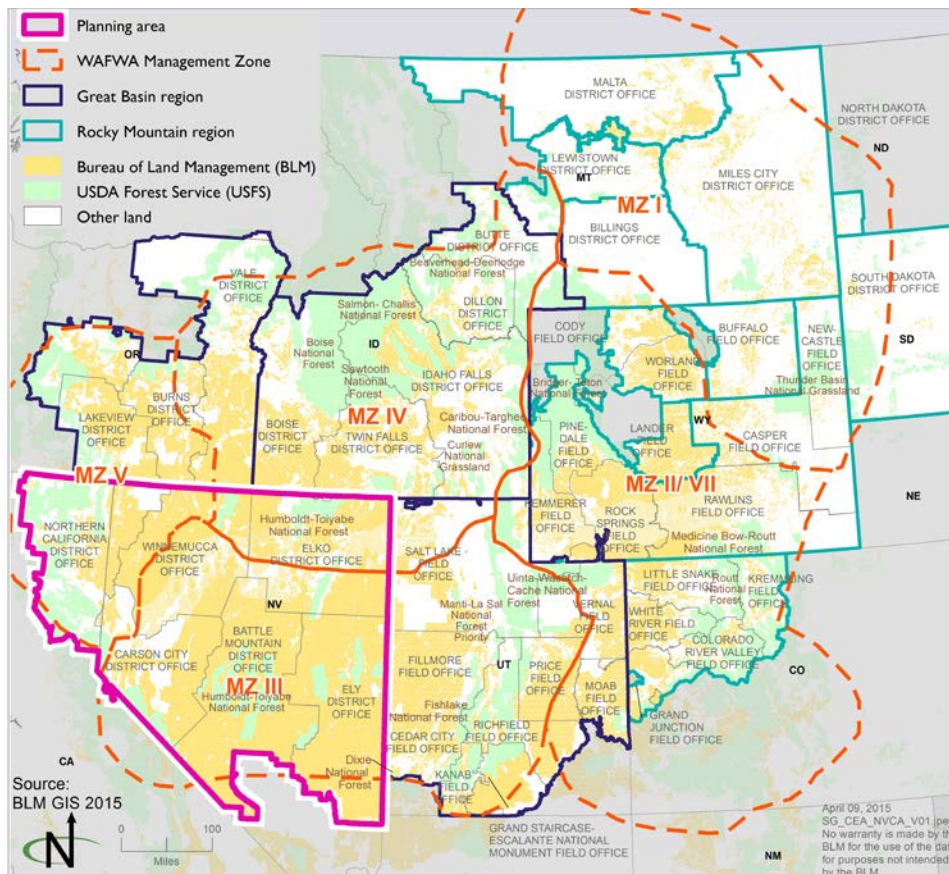
The analysis of nonfederal lands and actions includes a review and analysis of the following:

- State plans
- Coordination with states and agencies during consistency reviews
- Additional data from non-BLM-administered lands

Figure 5-1 shows the boundaries of the WAFWA Management Zones and the BLM and Forest Service planning areas and sub-regions. The Nevada and Northeastern California Sub-region contains a substantial portion of the priority habitat management areas (PHMA) and general habitat management areas (GHMA) within MZ III (6,291,000 acres of PHMA out of 9,280,000 total acres in MZ III or 68 percent of PHMA; and 3,808,700 acres of GHMA out of 4,774,200 total acres in MZ III or 80 percent of GHMA) (Manier et al. 2013, p. 118). The remaining PHMA and GHMA within MZ III are contained within the Utah Sub-region, the only other sub-region within MZ III. As a result, actions in the Nevada and Northeastern California Sub-region may have a relatively large cumulative impact in terms of number of acres and populations of GRSG compared to those actions in the Utah sub-region.

The Nevada and Northeastern California Sub-region contains relatively little PHMA and GHMA in MZ IV compared to the total PHMA and GHMA within MZ IV (5,839,300 acres of PHMA out of 22,105,600 total acres in MZ IV or 26 percent of PHMA; and 1,397,200 acres of GHMA out of 10,128,500 total acres in MZ IV or 14 percent of GHMA) (Manier et al. 2013, p. 118). The remaining

Figure 5-1
WAFWA Management Zone in the Nevada and Northeastern Subregion BLM and Forest Service Planning Area



PHMA and GHMA within MZ IV are contained within five other sub-regions or planning areas, including the Idaho and Southwestern Montana Sub-region, which is by far the largest sub-region within MZ IV. As a result, actions in the Nevada and Northeastern California Sub-region may have a relatively small cumulative impact in terms of number of acres and population of GRSG compared to those actions in other, larger sub-regions within MZ IV, particularly the Idaho and Southwestern Montana Sub-region.

The Nevada and Northeastern California Sub-region contains approximately half of the PHMA and a relatively small amount of the GHMA within MZ V (4,032,900 acres of PHMA out of 7,289,000 total acres in MZ V or 55 percent of PHMA; and 635,000 acres of GHMA out of 5,759,900 total acres in MZ V or 11 percent of GHMA) (Manier et al. 2013, p. 118). The remaining PHMA and GHMA within MZ V are contained within the Oregon Sub-region, the only other sub-region within MZ V. As a result, actions in the Nevada and Northeastern California Sub-region within PHMA may have a similar cumulative impact in terms of number of acres and population of GRSG compared to those actions in the Oregon Sub-region. Actions in the Nevada and Northeastern

California Sub-region within GHMA will likely have a much smaller cumulative impact in terms of number of acres and population of GRSB compared to those actions in the Oregon Sub-region in GHMA.

Section 5.1.1, Methods, provides a description of the methodology used for this cumulative effects analysis. **Section 5.1.2** lists assumptions used in the analysis. **Section 5.1.3** describes existing conditions in WAFWA MZ III and in the Nevada and Northeastern California Sub-region. **Section 5.1.4** provides a broad-scale description of regional efforts to manage GRSB habitat in MZ III. **Section 5.1.5** discusses the relevant cumulative actions in MZ III that will be analyzed in this CEA. **Section 5.1.6** analyzes threats to GRSB and its habitat in MZ III and discusses the potential cumulative effects resulting from each threat for each alternative. **Section 5.1.7** describes existing conditions in WAFWA MZ IV. **Section 5.1.8** provides a broad-scale description of regional efforts to manage GRSB and its habitat in MZ IV. **Section 5.1.9** discusses the relevant cumulative actions in MZ IV that will be analyzed in this CEA. **Section 5.1.10** analyzes threats to GRSB and its habitat in MZ IV and discusses the potential cumulative effects resulting from each threat for each alternative. **Section 5.1.11** describes existing conditions in WAFWA MZ V. **Section 5.1.12** provides a broad-scale description of regional efforts to manage GRSB habitat in MZ V. **Section 5.1.13** discusses the relevant cumulative actions in MZ V that will be analyzed in this CEA. **Section 5.1.14** analyzes threats to GRSB and its habitat in MZ V and discusses the potential cumulative effects resulting from each threat for each alternative. **Section 5.1.15**, Conclusions, determines the cumulative effects on GRSB and its habitat as a result of implementing each alternative in combination with other private, local, regional, state, and federal past, present, and reasonably foreseeable future actions in MZs III, IV and V. **Section 5.1.16** lists a selection of some of the larger projects from the reasonably foreseeable future actions tables in the RMPs/LUPAs for MZs III, IV, and V.

5.1.1 Methods

The CEA uses the following methods:

- Data from the USGS publication Summary of Science, Activities, Programs, and Policies That Influence the Range-Wide Conservation of Greater Sage-Grouse (Manier et al. 2013) establishes the reference condition against which the alternatives and other past, present, and reasonably foreseeable future actions are compared. Data from this publication are presented in terms of priority habitat and general habitat.
- The USFWS's 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered (USFWS 2010a) and the USFWS publication Conservation Objectives: Final Report (i.e., the COT report; USFWS 2013a) were reviewed to identify the primary threats facing

GRSG in each WAFWA MZ. Table 2 of the COT report lists threats to GRSG that are present and widespread in each population in the MZ.

- For MZs III, IV, and V, the list of threats that are directly or indirectly affected by the BLM and Forest Service actions are wildfire, spread of invasive plants, conifer encroachment, infrastructure development, livestock grazing and free-roaming equids, conversion to agriculture, energy development, mining, and recreation (USFWS 2013a). Three other threats listed in the COT report, sagebrush eradication, isolation/small population size, and urbanization, affect GRSG populations in MZs III, IV, and V. While they are not addressed separately in this analysis, they are discussed as elements of other threats.
- Predation was not included as a threat in the final COT report and was not identified by USFWS as a significant threat to GRSG populations (USFWS 2010a). Predation is a natural occurrence that may be enhanced by human habitat modifications such as construction of infrastructure that may increase opportunities for nesting and perching or increase exposure of GRSG nests. In such altered habitats, predators may exert an undue influence on GRSG populations. Predation is discussed in this CEA in the context of these other threats.
- Sagebrush eradication is a component of many threats. Isolation/small population size is not analyzed separately, because no management actions directly address this threat. These two threats are discussed as a component of other threats and in the conclusions.
- Not all the threats discussed in this analysis represent major threats to GRSG in each sub-region in the MZ, but each poses a present and widespread threat to at least one population within the MZ.
- Each threat is analyzed, and a brief conclusion for each threat is provided.
 - The BLM NOC compiled MZ-wide datasets for quantifiable actions in all proposed BLM and Forest Service GRSG LUPA/EISs in MZs III, IV, and V. Forest Service data are included in MZs III and IV. These datasets provide a means by which to quantify cumulative impacts resulting from direct impacts of the threats identified in the COT report.
 - Data and information were gathered from other federal, state, and local agencies and tribal governments, where available, and were used to inform the analysis of cumulative impacts on GRSG from each of the threats in MZs III, IV, and V.

- The tables in this cumulative analysis display the number of acres across the entire MZ and the percentage of those acres that are located within the Nevada and Northeastern California Sub-region. To calculate the total number of acres in the MZ, the number of acres in the other BLM and Forest Service Proposed Plans across the MZ are added to the number of acres in the applicable Nevada and Northeastern California LUPA alternative. For example, the total number of acres for Alternative A includes all of the other Proposed Plans in the MZ plus Nevada and Northeastern California LUPA Alternative A.
- A discussion is provided for each alternative in **Section 5.1.15**. Each alternative considers the cumulative impacts on GRSG from each of the threats. It also considers whether those threats can be ameliorated by implementing that particular alternative in conjunction with past, present, and reasonably foreseeable non-BLM and non-Forest Service actions in MZs III, IV, and V.
- The list of relevant cumulative BLM and Forest Service actions in **Sections 5.1.5, 5.1.9, and 5.1.13** were derived from each proposed BLM and Forest Service GRSG LUPA/EIS in MZs III, IV, and V to provide an overview of the ongoing and proposed land uses there.
- Baseline data that are consistent across planning areas and that analyze cumulative effects for each alternative, including the No Action Alternative and Proposed Plan, are used in this analysis.
- This analysis uses the most recent information available. For purposes of this analysis, the BLM and Forest Service have determined that the Proposed Plans for the other ongoing GRSG planning efforts in MZs III, IV, and V are reasonably foreseeable future actions.
- PHMA and GHMA were developed to protect the best habitat and highest population density of GRSG. Although Alternative A does not designate PHMA or GHMA, spatial GIS data were clipped to these boundaries to allow for a consistent comparison across all alternatives.

5.1.2 Assumptions

This cumulative analysis uses the same assumptions and indicators as those established for the analysis of direct and indirect effects on GRSG as discussed in **Section 4.4.9**. In addition, the following assumptions have been made:

- The timeframe for this analysis is 20 years.

- The CEA area extends beyond the Nevada and Northeastern California Sub-region and encompasses all of WAFWA MZs III, IV, and V; the quantitative impact analysis focuses on impacts across the MZs. The MZ is the appropriate scope for this analysis because it encompasses areas with similar floristic conditions containing important GRSG habitat.
- The magnitude of each threat to GRSG would vary geographically and may have more or less impact on GRSG and its habitat in some parts of the MZs, depending on such factors as climate, land use patterns, and topography.
- All acres in this analysis are presented by PHMA and GHMA, consistent with the analysis of direct and indirect impacts earlier in this EIS. The exception to this is quantitative data for the Summary of Science, Activities, Programs, and Policies That Influence the Range-Wide Conservation of Greater Sage-Grouse (Manier et al. 2013), which used Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH) to describe GRSG habitat. Where Manier et al. (2013) data are used in this CEA, “priority habitat” refers to PPH and “general habitat” refers to PGH.
- A management action or alternative would result in a net conservation gain to GRSG and its habitat if there is an actual benefit or gain above baseline conditions. Baseline conditions are defined as the pre-existing condition of a defined area and/or resource that can be quantified by an appropriate metric(s). During environmental reviews, the baseline is considered the affected environment that exists at the time of the review’s initiation and is used to compare predictions of the effects of the Proposed Plan or the effects of a reasonable range of alternative actions.
- The CEA quantitatively analyzes impacts on GRSG and its habitat in the MZ. Impacts on threats to GRSG habitat are likely to correspond to impacts on threats to GRSG populations within the MZs, since reductions or alterations in habitat could affect reproductive success through reductions in available cover, forage, or nest sites. Human activity could cause disturbance to GRSG and its habitat, preventing them from mating or successfully rearing offspring. Human activities also could increase opportunities for predation, disease, or other stressors (Connelly et al. 2004; USFWS 2010a; Manier et al. 2013).

5.1.3 Existing Conditions in WAFWA MZ III and the Nevada and Northeastern California Sub-Region

This section summarizes existing conditions and past and present actions for the Nevada and Northeastern California Sub-region (provided in more detail in

Chapter 3) and for MZ III as a whole. Reasonably foreseeable future actions are discussed in **Section 5.1.5**.

GRSG Habitat and Populations

MZ III consists of seven GRSG populations in Nevada and Utah (USFWS 2013a, p. 19-22), including Northeast Interior Utah, Sheeprock, Emery, and South Central Utah in Utah, and Northwest Interior Nevada, Southern Great Basin, and Quinn Canyon Range in Nevada. Several populations of GRSG in California (Pine Nut, Mono Lake, South Mono Lake, and White Mountains) are part of the Bi-State distinct population segment (DPS) of GRSG; this DPS is not discussed further, as the Bi-State DPS is being addressed under a separate planning effort and is not included in this CEA.

The Nevada and Northeastern California Sub-region includes those populations above within Nevada, and portions of additional populations within adjacent MZs, including the Northern Great Basin population in MZ IV and the Warm Springs Valley, Klamath, and Western Great Basin populations in MZ V (Garton et al. 2011, p. 297).

MZ III is part of a stronghold for GRSG (that includes MZs III, IV, and V) due in part to large areas of sagebrush habitat in Nevada (USFWS 2013a, p. 70). MZs III, IV, and V contain the largest area of habitat range-wide with low similarity to extirpated portions of the range (Wisdom et al. 2011). Despite containing large expanses of sagebrush habitat, this MZ faces high risks due to wildfire (USFWS 2013a, p. 70), difficulty in restoring burned habitat (Pyke 2011), and the unpredictability of location, extent, and outcome of wildfire (USFWS 2013a).

Throughout MZ III, BLM-administered, National Forest System, and other federal lands account for over 11 million acres of GRSG habitat (nearly 80 percent of all GRSG habitat in the MZ), with state and private lands accounting for approximately 2.6 million acres of GRSG habitat (nearly 20 percent of habitat) (Manier et al. 2013, p. 118). The BLM also has some management authority over split-estate lands, with privately held surface and federal subsurface mineral rights. The higher percentage of GRSG habitat on BLM-administered and other federal land means BLM and Forest Service management could play a key role in alleviating threats to GRSG in MZ III.

Table 5-1 provides a breakdown of landownership and acres of GRSG habitat in MZ III, including portions of the BLM and Forest Service sub-regions within MZ III. As the table shows, of the approximately 10 million acres of priority habitat and nearly 4 million acres of general habitat in MZ III, approximately 63 percent of priority habitat and 81 percent of general habitat is on BLM-administered lands. Approximately 12 percent of priority habitat and approximately 9 percent of general habitat is on National Forest System Lands.

Table 5-1
Management Jurisdiction in MZ III by Acres of Priority and General Habitats

	Total Surface Area (Acres)	Priority Habitat (Acres)	General Habitat (Acres)	Non-habitat (Acres)
MZ III	78,429,300 (100%)	10,028,500 (13%)	3,970,100 (5%)	64,430,700 (82%)
BLM	45,097,500 (58%)	6,309,400 (63%)	3,199,800 (81%)	35,588,300 (55%)
Forest Service	12,377,600 (16%)	1,236,200 (12%)	356,200 (9%)	10,785,200 (17%)
Tribal and Other Federal	5,282,700 (7%)	260,800 (3%)	29,100 (<1%)	4,992,800 (8%)
Private	12,251,400 (16%)	1,836,200 (18%)	384,800 (10%)	10,030,400 (16%)
State	3,101,900 (4%)	385,900 (4%)	200 (<1%)	2,715,800 (4%)

Source: Manier et al. 2013, p. 118

Sub-Region Habitat Conditions

Sagebrush cover is limited and patchy across much of the Nevada and Northeastern California Sub-region, as dictated by the “basin and range” topography characteristic of large portions of the sub-region. This condition is evident in the lack of connectivity among subpopulations in this region (Knick and Hanser 2011). Lower elevation valley bottoms often are dominated by non-GRSG habitat, including playas and salt desert shrub vegetation, but transition to sagebrush-dominated benches as elevation rises. These sagebrush-dominated benches often comprise breeding and winter habitat (USFWS 2013a, p. 73). Moving up in elevation, pinyon and juniper woodlands dominate mid-elevation areas; these woodlands then give way to little sagebrush, mountain big sagebrush, and mountain shrub communities used by GRSG as nesting and brood-rearing habitat in the higher elevations (USFWS 2013a, p. 74).

Large areas of GRSG habitat in the sub-region have been substantially altered from their natural condition as a result of altered fire regimes and spread of invasive annual grasses like cheatgrass (*Bromus tectorum*), native conifers like juniper (*Juniperus* spp.), and in some cases pinyon pine (*Pinus monophylla*). The amount of GRSG habitat affected by fire in the region is approximately ten times greater than is typical in the Wyoming Basin (MZ II) to the east (Manier et al. 2013, p. 132). Wildfire is closely linked with invasion and dominance of annual grasses, especially cheatgrass, due to fire’s effect on fuel composition and fire-return intervals. Cheatgrass invasion has been widespread in this region for decades, and some former (historic) habitats are likely “unrecoverable” without unreasonable expenditures of cost and time (Manier et al. 2013, p. 132).

Additionally, past and ongoing human activities have further fragmented or reduced GRSG habitat in MZ III. Common human disturbances in the MZ include mining and associated infrastructure, roads, transmission lines, and other

rights-of-way (ROWs), renewable energy development and associated infrastructure, grazing development including fences, and to a lesser extent recreation, agriculture, and urban conversion.

Habitat degradation is a complicated interaction among many factors, including drought, unmanaged or improperly managed livestock grazing, changes in natural fire regimes, conifer encroachment, and invasive plant species; changes in land use and land development are also causes of habitat loss (Fischer et al. 1996; Pyle and Crawford 1996; Beck and Mitchell 2000; Nelle et al. 2000).

Nevada and Northeastern California GRSG LUPA/EIS Alternatives

The Nevada and Northeastern California GRSG LUPA/EIS evaluated the following seven alternatives:

- Alternative A, current management (the No Action Alternative)
- Alternative B, which uses GRSG conservation measures in A Report on National Greater Sage-Grouse Conservation Measures (NTT 2011) to form BLM and Forest Service management direction
- Alternative C, which uses individual and conservation group-submitted management recommendations for GRSG and GRSG habitat to form BLM and Forest Service management direction
- Alternative D, the BLM and Forest Service agency-preferred alternative, which emphasizes balancing resources and resource use among competing human interests, land use, and conservation of natural and cultural resource values, while sustaining and enhancing ecological integrity
- Alternative E, which is based on the State of Nevada's Conservation Plan for GRSG in Nevada (Sagebrush Ecosystem Technical Team [SETT] 2014a)
- Alternative F, which also uses individual and conservation group-submitted management recommendations for GRSG and GRSG habitat; this alternative differs from Alternative C on issues related to grazing, wild horse and burro management, lands and realty, and minerals
- The Proposed Plan, which is based on modifications made to the draft agency-preferred alternative (Alternative D), is based on public comments received on the Draft LUPA/EIS, internal BLM and Forest Service review, new information, and best available science. The Proposed Plan incorporates adaptive management, monitoring, and mitigation for GRSG and its habitat, as well as incorporation of RDFs (consistent with applicable law) to further reduce project impacts on GRSG habitat

Utah GRSG LUPA/EIS Alternatives

The Utah GRSG LUPA/EIS evaluated the following seven alternatives:

- Alternative A, current management (the No Action Alternative)
- Alternative B, which uses GRSG conservation measures in A Report on National Greater Sage-Grouse Conservation Measures (NTT 2011) to form BLM and Forest Service management direction
- Alternative C, which uses individual and conservation group-submitted management recommendations for GRSG and GRSG habitat to form BLM and Forest Service management direction
- Alternative D, which is the Utah Sub-region's alternative (the agency-preferred alternative). This alternative was developed by the Utah BLM in cooperation with the Forest Service Intermountain Region and local USFWS. This alternative includes modifications to the conservation measures identified in the NTT report and is designed to address local ecological site variability. This alternative also emphasizes balancing resources and resource uses among competing human interests, land uses, and the conservation of GRSG habitat.
- Alternative E is divided into two alternatives, Alternative E1 and Alternative E2. Alternative E1 is based on the *State of Utah's Conservation Plan for Greater Sage Grouse in Utah* (Utah Greater Sage-Grouse Working Group 2013) and would apply to all BLM-administered and National Forest System lands in Utah. Alternative E2 is based on the State of Wyoming's Governor's Executive Orders 2011-05 and 2013-3 with adjustments by the BLM interdisciplinary team, which includes members of the Wyoming Governor's Office. The management actions being considered under Alternative E2 would only apply to National Forest System lands in Wyoming.
- The Proposed Plan, which is based on modifications made to the draft agency-preferred alternative (Alternative D), is based on public comments received on the Draft LUPA/EIS, internal BLM and Forest Service review, new information, and best available science. The Proposed Plan incorporates adaptive management, monitoring, and mitigation for GRSG, as well as incorporation of RDFs (consistent with applicable law) to further reduce project impacts on GRSG habitat.

Population Trends in Management Zone III

Populations within MZ III are described under *GRSG Habitat and Populations*, above. Trends for these populations are summarized below.

MZ III contains the most GRSG populations (along with MZ IV) of MZs range-wide; however, these populations are also some of the most isolated and exhibit lower densities of strutting male GRSG at leks (Manier et al. 2013, p. 11). MZ III is one of two major MZs (along with MZ IV) declining the slowest from 2007 to 2013, with a population decline of approximately one-third (Garton et al. 2015, p. 24). Predicted population trends indicate that overall, populations in MZ III have a 0 percent chance of falling below 200 males by 2037 and an 8 percent chance of falling below 200 males by 2107 (USFWS 2013a, page 70).

The Nevada portion of the Southern Great Basin population contains the largest number of GRSG within MZ III (USFWS 2013a, p. 70). Garton et al. (2011) determined that this population has declined by 19 percent between 1965 and 2007, and by 33 percent between 2007 and 2013 (Garton et al. 2015, p. 15). In addition, Garton et al. (2011) determined that this population has a 2 percent chance of declining below 200 males within the next 30 years and a 78 percent chance of declining below 200 males within 100 years (by 2107). However, these scenarios may be drastically influenced by unforeseen stochastic events or novel environmental conditions.

For the Northeast Interior Utah population, Garton et al. (2011, p. 330) reported that the population declined by 26 percent from 1970 to 2007, and declined by 42 percent from 2007 to 2013 (Garton et al. 2015, p. 14). While the Emery population declined by 30 percent from 1970 to 2007 (Garton et al. 2011, p. 332), this population doubled between 2007 and 2013 based on counts at two leks (Garton et al. 2015, p. 14). While the South Central Utah population remained relatively stable over the 1970 to 2007 period (Garton et al. 2011, p. 332), this population declined by approximately 51 percent between 2007 and 2013 (Garton et al. 2015, p. 15).

While population estimates and trends for the sub-region are not available, GRSG populations are described in **Section 3.2**.

5.1.4 Regional Efforts to Manage Threats to GRSG

Regional efforts include past, present, and reasonably foreseeable actions conducted by the BLM, Forest Service, and other federal agencies, including actions performed in cooperation with non-federal agencies, organizations, landowners, or other groups in MZ III. These efforts would be applicable on state and private lands, which contain approximately 2.6 million acres (32 percent) of GRSG habitat (Manier et al. 2013, p. 118). The boundaries of MZ III encompass portions of the states of Nevada, California, and Utah. Regional efforts occurring in these states are also discussed below.

Other BLM and Forest Service Planning Efforts

As part of the GRSG Range-wide Planning Effort, other BLM and Forest Service sub-regions, as explained in Chapter 1, are undergoing LUPA/EIS processes similar to this one for the Nevada and Northeastern California Sub-region. The

Final EIS associated with each of these efforts has identified a Proposed Plan that meets the purpose and need of conserving, enhancing, and/or restoring GRSG habitat by reducing, eliminating, or minimizing threats. The management actions from the various Proposed Plans will cumulatively decrease the threat of GRSG habitat loss and will limit fragmentation throughout the range. Key actions present in many of the Proposed Plans include changes in land use allocations, a mitigation framework, an adaptive management strategy, monitoring plan, mitigation requirements, anthropogenic disturbance cap, and lek buffers.

Additionally, California BLM field offices have included the Population Management Unit (PMU) conservation strategies for GRSG within their current RMPs.

The BLM and Forest Service have incorporated management of Sagebrush Focal Areas (SFAs) into their proposed management actions for GRSG and its habitat. SFAs are a subset of PHMA and represent recognized “strongholds” for the species that have been noted and identified by USFWS as having the highest densities of the species and other criteria important for the persistence of the species. Those portions of SFAs on BLM-administered or National Forest System lands would be recommended for withdrawal from mineral entry, subject to a NSO stipulation with no exceptions, modifications, or waivers, and are prioritized for management and conservation actions, including, but not limited to, review of livestock grazing permits/leases. Management of SFAs would enhance protection of GRSG and its habitat in these areas, providing a net conservation gain to GRSG habitats in light of other past, present, and reasonably foreseeable future actions considered in this CEA. There are no SFAs in MZ III; however SFAs do exist in MZs IV and V, as discussed in **Section 5.1.8** and **Section 5.1.12**.

Nevada/California State Efforts

Nevada State Plan. The State of Nevada submitted a state alternative for inclusion in the Nevada and Northeastern California Sub-Regional GRSG Draft LUPA/EIS. The *Nevada Greater Sage-Grouse Conservation Plan* (SETT 2014a) includes regulatory mechanisms to avoid, minimize (with the use of design features), and/or mitigate impacts through the Conservation Credit System (described in additional detail below) to protect and restore GRSG habitat. The plan defines a Sage-Grouse Management Area (SGMA), and aims to reach a conservation goal of a net conservation gain of GRSG habitat due to new anthropogenic disturbances. The state plan identifies GRSG core, priority, and general habitat within the SGMA.

Under the plan, project proponents must seek to avoid GRSG habitat disturbance. If a project proponent wishes to demonstrate that avoidance cannot be reasonably accomplished, minimization and mitigation would be applied through SETT consultation. The project proponent must demonstrate that specific criteria are met; criteria are summarized in Table 3-1 of the plan.

Criteria are more stringent in core habitat and less stringent in general habitat. If a project cannot avoid adverse effects (direct or indirect) to GRS habitat, the project proponent will be required to implement design features that minimize the project's adverse effects on GRS habitat to the extent practicable. Mitigation would be required for all anthropogenic disturbances to GRS habitat, including those that have minimized disturbances through the process above. Mitigation requirements will be determined by the Conservation Credit System, a market-based mechanism that quantifies conservation outcomes (credits) and impacts from new anthropogenic disturbances (debits), defines standards for market transactions, and tracks conservation action implementation progress in the state.

GRS habitat is determined based on the Nevada Habitat Suitability Map (described below) for GRS habitat prepared by the state and USGS. The habitat map incorporates GRS telemetry data along with environmental data at multiple scales, such as land cover, vegetation communities, physiographic indices, and anthropogenic attributes. The habitat suitability model will be used to inform management decisions on protecting GRS habitat and to provide strategic decision tools to identify where conservation activities will have the greatest beneficial impact on GRS and its habitat.

The Nevada state plan only applies to lands within Nevada; it does not apply to portions of the Nevada and Northeastern California Sub-region within California.

The Greater Sage-Grouse Conservation Plan for Nevada and Eastern California. The plan (Sage-Grouse Conservation Team 2004) is a collaboration between the Nevada Governor's Sage-Grouse Conservation Team, Nevada Department of Wildlife, and the California Department of Fish and Game (now California Department of Fish and Wildlife). The plan provides an assessment of GRS populations in Nevada and Eastern California, the risk factors facing GRS populations, strategies and actions to reduce or eliminate those risk factors, and implementation and monitoring strategies. The risk factors identified as affecting Nevada and California GRS populations the most include habitat quantity, quality, and wildfire. The plan provides recommended management actions to improve or mitigate these risk factors, including conifer removal, wildfire prevention, vegetation treatments, sagebrush and perennial grass restoration techniques, evaluating and altering livestock grazing, and cheatgrass management.

Nevada State Regulations/Programs. Nevada has several state regulations and programs pertaining to GRS. Assembly Bill 461 formally created and gave regulatory authorization for the Sagebrush Ecosystem Program. Governor Sandoval signed the bill into law in July 2013. Nevada also has a pesticide registration fee; portions of the revenue from the fee will provide funding to the state noxious weed program and GRS habitat conservation (NDA 2013). The state also has a Nevada Cheatgrass Action Team, a voluntary multi-disciplinary

group of individuals to assist the SETT with planning and managing projects to address cheatgrass and other invasive plants that impact GRSG habitat.

Nevada and Northeastern California GRSG Habitat Mapping. GRSG habitat for the sub-region was derived from a quantitative approach using “A *Spatially Explicit Modeling of Greater Sage-Grouse Habitat in Nevada and Northeastern California: A Decision Support Tool for Management*” (Coates et al. 2014a). GRSG telemetry location data were compiled from multiple areas across Nevada and northeastern California. Telemetry data were then linked spatially with corresponding environmental covariates to enable calculations of population-level resource selection functions (Manly et al. 2002). Locations of active leks were used as an additional dataset for map validation. The map reflects both the presence of GRSG and the presence of habitat features associated with GRSG occupancy and can be used to prioritize areas for different management scenarios. The strength of the map is to account for characteristics that describe the quality of the environment for GRSG, as well as an index of population abundance (Coates et al. 2014a; See *Chapter 3, Section 3.2.3-Management Zones*). The three management categories derived from this mapping process for the Nevada and Northeastern California Sub-region include “Priority,” “General,” and “Other” Habitat Management Areas.

Additional regional efforts specific to the Bi-State DPS of GRSG exist; however, these efforts are not discussed here, as the Bi-State DPS is not included in this CEA.

Utah State Efforts

The UDWR developed a *Conservation Plan for Greater Sage-Grouse in Utah* (Utah Greater Sage-Grouse Working Group 2013). The conservation plan identifies 11 population areas in Utah that are the focus of GRSG conservation efforts and helps coordinate the efforts of ten local working groups in the state. The goal of the *Conservation Plan for Greater Sage-Grouse in Utah* is to protect, maintain, improve, and enhance GRSG populations and habitats on public and private lands within established SGMAs (population areas). It includes conservation strategies and measurable objectives regarding populations and habitat, including a 5 percent permanent disturbance limit (as of April 2013), and through Utah Executive Order EO/2015/002 (see below), provides a regulatory mechanism to preserve GRSG through specific restrictions on public or private land use.

On February 25, 2015, Utah Governor Gary Herbert signed Utah Executive Order EO/2015/002. The Executive Order directs state agencies whose actions may affect GRSG to implement Utah’s *Conservation Plan for Greater Sage-Grouse in Utah* (Utah Greater Sage-Grouse Working Group 2013) in GRSG population areas identified in the 2013 Conservation Plan.

Earlier efforts in Utah included formation of Utah’s Sage-Grouse Plan Committee, comprised of members from public and private entities, which

prioritized threats to the species across the state in Utah's Greater Sage-Grouse Management Plan (UDWR 2009). The plan sought to protect and maintain occupied habitat, while restoring 175,000 acres of habitat by 2014. The plan provided an overall strategy for local working groups to use in implementing conservation actions, while providing annual updates detailing those actions taken for specific strategies identified in each plan. One recent report for the Strawberry Valley Adaptive Resource Management Area reported that 10,223 acres had been purchased within the management area by the Utah Reclamation and Mitigation Commission (Strawberry Valley Adaptive Resource Management Local Working Group 2006).

Natural Resources Conservation Service Sage-Grouse Initiative

The Natural Resources Conservation Service's (NRCS) Sage-Grouse Initiative (SGI) is working with private landowners in 11 western states to improve habitat for GRSG (Manier et al. 2013). With approximately 31 percent of all sagebrush habitats across the range in private ownership (Stiver 2011, p. 39), including approximately 2.2 million acres (16 percent) in MZ III (Manier et al. 2013, p. 118), a unique opportunity exists for the NRCS to benefit GRSG and to ensure the persistence of large and intact rangelands through long-term contracts and conservation easements. Although most SGI funds are invested on private lands, funds are also used to implement conservation measures on BLM-administered and other public lands.

Participation in the SGI program is voluntary, but willing participants enter into binding contracts to ensure that conservation practices that enhance GRSG habitat, such as fence marking, protecting riparian areas, and maintaining vegetation in nesting areas, are implemented. Participating landowners are bound by a contract (usually 3 to 5 years) to implement, in consultation with NRCS staff, conservation practices if they wish to receive the financial incentives offered by the SGI. These financial incentives generally take the form of payments to offset costs of implementing conservation practices and easements or rental payments for long-term conservation.

While potentially effective at conserving GRSG populations and habitat on private lands, incentive-based conservation programs that fund the SGI generally require reauthorization from Congress under subsequent farm bills, meaning future funding is not guaranteed.

As of 2015, SGI has secured conservation easements on over 455,000 acres across the GRSG range (NRCS 2015), with the largest percentage of easements occurring in Wyoming (approximately 200,000 acres). In MZ III, SGI has thus far secured conservation easements on 11,191 acres that maintain intact sagebrush-grassland habitat. It has also accomplished the following within MZ III:

- Established over 37,000 acres where grazing management promotes GRSG habitat and sustainable ranching

- Removed conifers encroaching on nearly 19,000 acres of GRSG habitat
- Seeded over 5,500 acres with native plants
- Marked 10 miles of fences in GRSG habitat

Other Regional Efforts

In addition, tribes, counties, and local working groups are playing a critical role in promoting GRSG conservation at the local level. Individual conservation plans have been prepared by most local working groups (USGS 2014) to develop and implement strategies to improve or maintain GRSG habitat and reduce or mitigate threats on the local level. The proposed conservation actions and recommendations in these plans are voluntary actions for private landowners. Local working group projects have included monitoring, research, and mapping habitat areas, as well as public outreach efforts such as landowner education and collaboration with federal, state, and other local entities. These efforts provide a net conservation gain to GRSG through increased monitoring and public awareness.

Elko County, in northeast Nevada, has developed a GRSG Management and Conservation Strategy Plan (County of Elko 2012). The plan is based primarily on wildfire, fuels, and predator reduction.

Several counties in Utah have adopted resolutions for GRSG management modeled on the statewide 2013 Conservation Plan for Greater Sage-grouse in Utah, with provisions specific to their county and the use of incentives and cooperative conservation programs.

The local working groups in the Utah Sub-region within MZ III (Castle Country, Color Country, Morgan-Summit, Parker Mountain, Rich County, Southwest Desert, Strawberry Valley, West Desert, and portions of Uinta Basin Adaptive Resource Management Local Working Groups) (USGS 2014) operate under plans providing an adaptive framework for voluntary and collaborative GRSG and GRSG habitat conservation at the local level, using state and federal agency-recommended strategies to address threats to GRSG in their local areas.

Similarly, there are seven local working groups in the Nevada and Northeastern California Sub-region within MZ III (portions of the Washoe/Modoc, North Central Nevada, Northeastern Nevada Stewardship Group, White Pine, Lincoln, and South Central Nevada working groups) (USGS 2014). Local working group boundaries generally contain several Population Management Unit (PMU) working groups, for example the Buffalo-Skedaddle working group in the Washoe/Modoc local working group).

5.1.5 Relevant Cumulative Actions

This cumulative effects analysis considers the incremental impact of the Nevada and Northeastern California GRSG LUPA and alternatives in combination with

other past, present, and reasonably foreseeable future federal and non-federal actions on lands in MZ III (see **Table 5-37**). Where these actions occur within GRSG habitat, they would cumulatively add to the impacts of BLM- and Forest Service-authorized activities set forth in the Nevada and Northeastern California LUPA. In addition to the conservation efforts described above, relevant reasonably foreseeable future cumulative actions occurring on federal, state, private, or mixed land ownership in MZ III are described in the Proposed RMPAs/LUPAs for Nevada and Northeastern California and Utah, which are incorporated by reference.

The following list includes past, present, and reasonably foreseeable future actions in MZ III that, when added to the Proposed Plan and alternatives for the Nevada and Northeastern California Sub-region, could cumulatively affect GRSG:

- TransWest Express, Energy Gateway South, and Zephyr transmission line projects, throughout Utah and a portion of Nevada
- Southern Nevada Water Authority ROWs, Nevada
- South Unit Oil and Gas Development, Duchesne County, Utah
- Greens Hollow Coal Extraction, Emery County, Utah
- Alton Coal Tract SITLA, Kane County, Utah
- West Tavaputs Plateau Natural Gas Full Field Development Plan, Carbon County, Utah
- Gasco Energy Inc. Uinta Basin Natural Gas Development Project, Uintah and Duchesne Counties, Utah
- Long Canyon Mine, Elko County, Nevada
- Luning and Enel Salt Wells Solar Energy Projects, Mineral and Churchill Counties, Nevada
- Salt Wells Geothermal Utilization Project, Churchill County, Nevada
- Conifer removal, fuels reductions, and vegetation projects throughout Utah and Nevada
- Grand Staircase-Escalante National Monument Livestock Grazing Plan Amendment, Kane and Garfield counties, Utah
- Eleven pending prospecting permits totaling over 22,000 acres in the sub-region in priority habitat and/or general habitat; ten are in the Battle Mountain District office and one is in the Winnemucca District Office (**Section 3.13**)

5.1.6 Threats to GRSG in Management Zone III

In its COT report, the USFWS identifies wildfire, spread of invasive plants, conifer encroachment, infrastructure development, livestock grazing and free-roaming equids, conversion to agriculture, energy development, mining, and recreation as the present and widespread threats facing GRSG in MZ III (USFWS 2013a). These threats impact GRSG mainly by fragmenting and degrading their habitat. The loss of sagebrush steppe across the West approaches or exceeds 50 percent in some areas. It is a primary factor in long-term declines in GRSG abundance across its historical range (USFWS 2010a).

Habitat fragmentation reduces connectivity of populations, increases predation pressure, and increases the likelihood of extirpation from random events such as drought or outbreak of West Nile virus. Furthermore, climate change is likely to affect habitat availability to some degree by decreasing summer flows and limiting growth of grasses and forbs, thereby limiting water and food supply. Climate change is also increasing certain threats, as increasing atmospheric CO₂ concentrations and warming temperatures favor cheatgrass and encroaching conifers (Knapp et al. 2001; Ziska et al. 2005; Blank et al. 2006) and warming temperatures and changing precipitation seasonality increases stress on sagebrush and increases the frequency of extreme burning conditions. Sensitive species such as GRSG, which are already stressed by declining habitat, increased development, and other factors, could experience additional pressures as a result of climate change.

Each COT report threat considered present and widespread in at least one population in MZ III is discussed below. For more detail on the nature and type of effects and the direct and indirect impacts on GRSG in the sub-region, see **Chapter 4** of the Nevada and Northeastern California GRSG LUPA/EIS. The quantitative impact analysis focuses on impacts in MZ III.

For those threats below that are analyzed quantitatively (infrastructure, livestock grazing, conversion to agriculture, energy development and mining, and recreation), acres presented in the analyses tables represent acres of land allocations from each of the Nevada and Northeastern California Sub-region LUPA/EIS alternatives in the Nevada and Northeastern California Sub-region portion of MZ III, combined with acres of land allocations from the Proposed Plans of additional BLM and Forest Service sub-regions in the non-Nevada and Northeastern California Sub-region portion of MZ III. Utah is the only other sub-region within MZ III, so the acres presented in the analyses tables are the Nevada and Northeastern California Proposed Plan allocations combined with allocations from each of the Utah alternatives. The percentages in the tables represent the relative contribution of each Nevada and Northeastern California Sub-region alternative to the total allocation in the MZ.

Wildfire

Nature and Type of Effects. Big sagebrush and low sagebrush burned by wildfire often require many years to recover, especially after large wildfires. Mountain sagebrush, however, can recover from soil-stored seed. Contiguous old-growth sagebrush sites are at high wildfire risk, as are large blocks of contiguous dead sagebrush and sagebrush sites with a substantial cheatgrass understory. Before recovering, these sites are of limited use to GRSG, except along the edges and in unburned islands.

Because of its widespread impact on habitat, wildfire has been identified as a primary factor associated with GRSG habitat loss and subsequent population declines. Depending on the species of sagebrush and the size of a burn, a return to a full pre-burn community cover can take from 25 to 120 years (Baker 2011; Miller et al. 2011). While wildfire may have variable effects on long- and short-term post-fire invertebrate food source availability for GRSG (Nelle et al. 2000, Fischer et al. 1996; Rickard 1970), any increase in invertebrate abundance may be of little value to GRSG as the reduction in vegetation cover post-wildfire would likely lead to increased predation vulnerability (Nelle et al. 2000).

While most sagebrush subspecies are killed by wildfire and are relatively slow to reestablish, cheatgrass recovers and reestablishes quickly after a wildfire from residual seed in the soil and increased seed production in the first two to three years after burning. Further, the longer that cheatgrass has been dominant on a site, the more it alters soil characteristics to favor reestablishment of itself after a fire and disfavor native species. This rapid recovery and site alteration can lead to a reoccurring wildfire cycle that often prevents sagebrush reestablishment (USFWS 2010a, p. 22).

BLM and Forest Service management to prevent or control wildfires can also affect GRSG and its habitat. Increased human activity and noise associated with wildfire suppression, fuels treatments, and prescribed fire in areas occupied by GRSG could affect breeding and foraging behavior. Important habitats could be altered over the long term from use of heavy equipment or temporarily from noise arising from small engines, such as chainsaws and pumps, and from low-level flights by fixed- and rotary-wing aircraft.

In addition, the reduced role of wildfire (i.e., wildfire suppression) can contribute to higher rates of conifer encroachment in some areas (Miller et al. 2011, p. 10). In the initial stages of encroachment, fuel loadings remain consistent with the sagebrush understory. As conifer encroachment advances, fire return intervals are altered by decreasing understory abundance. The depleted understory causes the stands to become resistant to low-intensity wildfires; over years, the accumulating conifer loads contribute to larger-scale wildfires and confound control efforts due to extreme fire behavior.

Conditions in the sub-region and MZ III. Wildfire has been a primary threat to GRSG habitats and populations occurring across MZ III; the number and size of areas affected annually by wildfire in MZ III are approximately ten times greater than is typical in the Wyoming Basin (MZ II) to the east (Manier et al. 2013, p. 132). Challenges related to wildfire and fuels management have become pronounced or extreme in MZ III where cheatgrass has invaded, increased wildfire intensity, and reduced wildfire return intervals (Manier et al. 2013, p. 81). In MZ III, 62 percent of priority habitat and general habitat have high risk for wildfire, including within most GRSG populations in MZ III (Manier et al. 2013, p. 85-87). Since 2000, approximately 404,000 acres (3 percent) of GRSG habitat has burned in this MZ, with an average of 13,500 acres of GRSG habitat burned annually and a maximum observed burned area of 55,000 acres (Manier et al. 2013, p. 132). Wildfires on BLM-administered lands contribute 60 percent of average acres burned in this MZ annually (Manier et al. 2013, p. 82).

The Northwest Interior Nevada population has been heavily impacted by past wildfire. Several sub-populations in this area (e.g., Eugene Mountains, East Range, Humboldt Range, Majuba Mountain, and Trinity Ranges) have been extirpated from their range due to severe wildfire and inability of the habitat to recover (USFWS 2013a, p. 73).

Impact Analysis. Management actions in the Nevada and Northeastern California Sub-region that emphasize wildfire suppression in GRSG habitat would benefit the species by limiting habitat loss in the event of wildfire. Under current management (Alternative A), prescribed burning may be used to achieve habitat objectives; most existing LUPs support objectives of reintroducing fire into fire-dependent ecosystems, prioritizing response to wildfires, and determining where fire can be used for resource benefit. Alternatives B through F and the Proposed Plan provide for similar protection and maintenance of sagebrush habitat in implementing prescribed burning. The action alternatives all prioritize sagebrush protection in fuels treatment programs and would provide protection for sagebrush in fuels treatment and wildfire suppression. The Proposed Plan would further reduce impacts from wildfire. The Greater Sage-Grouse Wildfire, Invasive Annual Grasses & Conifer Expansion Assessment (Fire and Invasive Assessment Tool [FIAT]) prioritizes landscapes for wildfire prevention and suppression, fuels management, and habitat restoration and rehabilitation within GRSG habitats based on resistance and resilience concepts in Chambers et al. (2014). Additionally, the Proposed Plan would provide additional protection of GRSG habitat in high-risk or fire-prone landscapes, including winter range, by addressing the COT report objectives during the NEPA analysis for the burn plan when prescribed fire is proposed in GRSG habitat. This is in accordance with the COT report objective to retain and restore healthy native sagebrush plant communities within the range of GRSG.

Recognition of the importance of sagebrush habitat during interagency wildfire response would benefit GRSG in the event of a wildfire. The State of Nevada is

implementing the Nevada Division of Forestry's Wildland Fire Protection Program, which will improve delivery of financial, technical, and equipment/human resources to Nevada counties in fuels reduction planning and implementation, wildfire management and suppression, and restoration of burned areas (SETT 2014a, p. 48). The Nevada state plan emphasizes pre-suppression, fire suppression, and post-fire restoration/rehabilitation activities in core GRSG habitat (SETT 2014a, p. 50-55). Similarly, the 2015 Utah executive order and conservation plan for GRSG (Utah Greater Sage-Grouse Working Group 2013) emphasizes prevention, suppression, and rehabilitation/restoration within GRSG management areas throughout the state. These programs would benefit GRSG during wildfire planning and response throughout MZ III, particularly on lands not administered by the BLM or Forest Service.

The Interagency Standards for Fire and Fire Aviation Operations "Red Book" includes BMPs for GRSG habitat conservation for wildlife and fuels management (BLM 2013n). This document is a supplemental policy or guidance for the BLM, the Forest Service, and the USFWS. These BMPs could benefit GRSG and its habitat during interagency wildland fire operations by using spatial habitat data and predictive services to prioritize and preposition firefighting resources in GRSG habitat. However, since several years have elapsed since GRSG BMPs were incorporated, benefits would likely now be apparent, and it is unclear if this is currently the case. In January 2015, Secretarial Order 3336 "Rangeland Fire Prevention, Management and Restoration" was signed by the Secretary of the Interior. The order sets forth enhanced policies and strategies for preventing and suppressing rangeland wildfire and for restoring sagebrush landscapes impacted by wildfire across the West for the DOI. The order will improve coordination with local, state, tribal, and regional efforts to address rangeland wildfire at a landscape level.

Coordination with rural fire districts to manage wildfires in GRSG habitat will further reduce this threat across land ownership types and improve the quality and quantity of habitat.

Reasonably foreseeable wildland fire management efforts are projected to increase (**Section 5.1.16**), especially through increased coordination of federal, state, and local fire prevention actions and the implementation of the Utah Sub-region BLM and Forest Service LUPA, the only other BLM and Forest Service LUPA that will be implemented in MZ III. When the impacts of the Nevada and Northeastern California Sub-region LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

However, in those years where wildfires that threaten the wildland-urban interface are widespread, firefighting resources would be shifted to those areas and away from GRSG habitat. Years with extensive involvement of wildland-

urban interface in wildfires may not see the expected benefits of policies and direction intended to increase wildfire response in GRSG habitat.

Spread of Invasive Plants

Nature and Type of Effects. As discussed in **Chapter 4**, invasive plants alter plant community structure and composition, productivity, nutrient cycling, and hydrology. Invasive plants also may cause declines in native plant populations, including sagebrush habitat, through such factors as competitive exclusion and niche displacement. Invasive plants reduce and may eliminate vegetation that GRSG use for food and cover. Invasive plants fragment existing GRSG habitat, which favors nest predators such as ravens (Howe et al. 2014), and reduce habitat quality by competitively excluding vegetation essential to GRSG. Invasive plants can also create long-term changes in ecosystem processes such as wildfire cycles and other disturbance regimes that persist even after an invasive plant infestation is removed (Connelly et al. 2004). In big sagebrush in the Great Basin, encroachment by invasive annual grasses has resulted in dramatic increases in the number of wildfires, wildfire return frequency, and widespread detrimental effects on GRSG habitat (Young and Evans 1978; West and Young 2000; West and Yorks 2002; Connelly et al. 2004 in Manier et al. 2013). Big sagebrush communities invaded by cheatgrass have estimated mean fire-return intervals of less than 10 years in many areas (Connelly et al. 2004), whereas a return to a full pre-burn community cover can take from 25 to 120 years depending on the species of sagebrush and the size of a burn (Baker 2011; Miller et al. 2011).

Roads and recreational activities can promote the spread of invasive plants through vehicular traffic. Invasive plants can further exacerbate the fragmenting effects of roadways. Improperly managed grazing in sagebrush habitats can lead to the demise of the most common perennial grasses in this system and an abundance of invasive annual grasses such as cheatgrass or medusahead (Reisner et al. 2013).

Conditions in the Sub-region and MZ III. Via seeds carried by wind, humans, machinery, and animals, invasive plants have invaded and will likely continue to invade many locations in MZ III, including in the sub-region. Some species, including cheatgrass, have become so ubiquitous throughout the sub-region that it is considered economically infeasible to attempt to eradicate them. Modeling has suggested that approximately 4.9 million acres (35 percent of priority habitat and general habitat) of GRSG habitat in MZ III are considered to be at a moderate to high risk for cheatgrass occurrence (Manier et al. 2013, p. 90).

The BLM and Forest Service currently manage invasive plant infestations through integrated weed management, including biological, chemical, mechanical, manual, and educational methods. The BLM is guided by the 1991 and 2007 Records of Decision (RODs) for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991a) and by the 2007 Programmatic

Environmental Report (BLM 2007a). The Humboldt-Toiyabe National Forest is guided by the *Humboldt and Toiyabe National Forest-wide Noxious Weed Treatment Environmental Assessment*. The BLM and Forest Service also participate in the National Early Warning and Rapid Response System for Invasive Species. The goal of this system is to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes (FICMNEW 2003). Invasive plants are managed in cooperation with county governments and represent a landscape-level approach across management jurisdictions.

Impact Analysis. Management actions in the Nevada and Northeastern California Sub-region that minimize ground disturbance in GRSG habitat would benefit the species by limiting potential for establishment and spread of invasive plants. Increased activity, such as surface disturbance, motorized transportation, and animal and human activity, would increase the chance for the establishment and spread of invasive plants.

Management under Alternative A would allow for the most acres of surface disturbance within GRSG habitat; therefore, the potential for invasive plants to spread and establish would be greatest under this alternative, and effects on GRSG habitat (e.g., reduction in quality of habitat) would be more pronounced. All of the action alternatives would reduce surface disturbance within GRSG habitat and would include invasive plant-prevention measures to some degree. Under all alternatives, BLM and Forest Service would work closely with local and state agencies to manage and treat invasive plants on public lands. The BLM and Forest Service would participate in exotic plant pest councils, state vegetation and noxious weed management committees, state invasive species councils, county weed districts, and weed management associations. Under Alternative E, state measures to minimize project disturbance in GRSG core GRSG habitat would include invasive plant treatment as part of comprehensive vegetation management.

Of all alternatives, the Proposed Plan would likely have the lowest potential for invasive plant spread and establishment, given the 3 percent anthropogenic disturbance threshold, which would limit surface disturbance; extensive mitigation and monitoring plans; FIAT assessments based on resistance and resilience concepts and subsequent prioritization; application of RDFs (consistent with applicable law); and incorporation of GRSG habitat objectives. The COT report objective for invasive species is to maintain and restore healthy native sagebrush plant communities; of all the alternatives, the Proposed Plan would best meet this objective.

Relevant cumulative actions that result in surface-disturbing activities, such as ROWs and energy and mining projects, would increase the potential for the spread of invasive plants on both federal and non-federal lands. Projects requiring state agency review and/or approval would be subject to conditions in

both the Nevada and Utah state plans, including control of invasive plant species and use of native seed mixes during reclamation, and the Utah disturbance cap, which would limit anthropogenic disturbances in GRSG management areas. The Nevada and Utah state plans also address invasive plant species in fire management. These stipulations would benefit GRSG habitat by limiting the spread or establishment of invasive plants, particularly on lands that lack BLM and Forest Service protective regulatory mechanisms.

Reasonably foreseeable invasive plant management efforts are projected to increase (**Section 5.1.16**), including other state and county noxious weed regulations and the implementation of the Utah BLM and Forest Service LUPA in MZ III. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III. The Proposed Plan may result in the greatest net conservation gain due to its 3 percent anthropogenic disturbance cap, which should reduce potential for the spread of weeds during the 20-year analysis period.

Conifer Encroachment

Nature and Type of Effects. Conifer woodlands, especially juniper (*Juniperus* spp.) and in some regions pinyon pine (*Pinus edulis*), may expand into sagebrush habitat and reduce availability of habitat for GRSG. Conifer expansion may be encouraged by human activities, including fire suppression and grazing (Miller et al. 2011). Trees offer perch sites for raptors; thus, woodland expansion may also increase the threat of predation, as would power lines (Manier et al. 2013, p. 91; Howe et al. 2014). Locations within approximately 1,000 yards of current pinyon and/or juniper woodlands are at highest risk of expansion (Bradley 2010). Studies have shown that GRSG incur population-level impacts at very low levels of conifer encroachment (Baruch-Mordo et al. 2013). In the Great Basin (best documented in MZs III, IV, and V), conifer encroachment reduces habitat quality in important seasonal GRSG ranges when woodland development is sufficient to restrict shrub and herbaceous production (Connelly et al. 2004 in Manier et al. 2013, p. 91).

Conditions in the Sub-region and in MZ III. Conifer encroachment risk is high on approximately 1.8 million acres (13 percent of priority habitat and general habitat combined) of GRSG habitat in MZ III, and approximately 58 percent of conifer encroachment risk in priority habitat (and 76 percent in general habitat) occur on BLM-administered lands within MZ III (Manier et al. 2013, p. 93). In comparison, 17 percent of conifer encroachment risk in priority habitat (and 6 percent in general habitat) occur on private lands and 19 percent in priority habitat occur on National Forest System lands (17 percent in general habitat). Therefore, BLM actions are likely to have the greatest potential to ameliorate the effects of conifer encroachment on GRSG habitat, in both priority habitat and general habitat, than any other single land management entity.

Impact Analysis. The COT objective is to remove conifer woodlands from areas of sagebrush that are most likely to support GRSG (post-removal) at a rate that is at least equal to the rate of encroachment (USFWS 2013a, p. 47). Management under Alternatives D, E, and the Proposed Plan would target conifers in GRSG habitat for removal. Treatment acres under the Proposed Plan are presented in **Table 2-3**; conifer removal would target Phase I and II encroachment near leks using the FIAT assessments to identify treatment locations. The Vegetation Dynamics Development Tool identifies the acres of treatment required per decade. The Proposed Plan would also incorporate GRSG habitat objectives to guide conifer encroachment treatments as outlined in **Table 2-2**. Under Alternative A, existing California BLM field office RMPs incorporate the Sage Steppe Ecosystem Restoration Strategy (BLM 2008f), which includes conifer removal projects. Alternatives B, C, and F are largely silent on conifer removal and thus would not serve to reduce this threat on BLM-administered and National Forest System lands in the sub-region, though the cumulative impact of other past, present, and reasonably foreseeable future actions in the sub-region and larger MZ would help reduce the threat across the MZ III.

Relevant cumulative actions on federal, private, and state lands within the MZ include several large conifer removal projects (see **Table 5-37**). Further, the NRCS carries out conservation measures to remove encroaching conifers near leks and other seasonal habitats while minimizing disturbance to GRSG (NRCS 2012, p. 13). SGI has helped reduce the threat of early succession conifer encroachment through mechanical removal on 18,885 acres of private lands within MZ III; SGI has also contributed funds for conifer removal projects on federal lands. The majority of these efforts were located inside PACs (NRCS 2015), helping to preserve historic fire return intervals and important GRSG habitat.

Reasonably foreseeable conifer encroachment management efforts are projected to increase (**Section 5.1.16**), including efforts on private land and implementation of the Utah BLM and Forest Service LUPA in MZ III. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III. The Proposed Plan would have the greatest reduction in the threat from conifer encroachment and provide a net conservation gain to GRSG. Alternatives D and E would also reduce the threat, though to a lesser degree than the Proposed Plan because they do not specify acres for treatment or habitat objectives.

Infrastructure

Rights-of-Way

Nature and Type of Effects. As discussed in **Chapter 4**, transmission lines can directly affect GRSG by posing a collision and electrocution hazard. They also

can indirectly decrease lek attendance and recruitment by providing perches and nesting habitat for potential avian predators such as golden eagles and ravens (Connelly et al. 2004, Coates et al. 2014b). In addition, power lines and pipelines often extend for many miles and fragment GRSG habitat. The ground disturbance associated with construction, as well as vehicle and human presence on maintenance roads, may introduce or spread invasive species over large areas, degrading habitat. Impacts from roads may include direct habitat loss from road construction and direct mortality from collisions with vehicles. Roads may also present barriers to migration corridors or seasonal habitats, facilitate predator movements, spread invasive plants, and increase human disturbance from noise and traffic (Forman and Alexander 1998).

Conditions in the Sub-region and in MZ III. Infrastructure, such as ROWs and associated facilities and urbanization, is widespread throughout MZ III. In some locations, infrastructure development has affected GRSG habitat. Development of roads, fences, and utility corridors has also contributed to habitat loss and fragmentation in portions of MZ III. The best available estimates suggest about 17 percent of MZ III is within approximately 4 miles of urban development (Knick et al. 2011, p. 214). Impacts of infrastructure development in MZ III are primarily related to highways, roads, power lines, and communication towers, with 90 percent of MZ III within 4 miles of a road, 14 percent within 4 miles of a power line, and 5 percent within 4 miles of a communication tower (Knick et al. 2011, pp. 215-216).

Although not representative of all infrastructure ROWs, transmission lines greater than 115 kilovolts indirectly influence 33 percent of priority habitat and 25 percent of general habitat across MZ III. Indirect effects are assumed to occur to a radius of 4 miles (Manier et al. 2013, p. 41). Approximately 53 percent of transmission lines in priority habitat and 80 percent in general habitat are on BLM-administered lands across GRSG habitats in MZ III (Manier et al. 2013, p. 41). In contrast, private and National Forest System lands contain 32 percent and 6 percent of transmission lines in priority habitat, respectively, and 15 percent and 5 percent in general habitat, respectively. Therefore, BLM actions are likely to have the greatest potential to affect transmission line ROWs in GRSG habitat than any other land management entity. Designating ROW exclusion and avoidance areas in PHMA and GHMA on BLM-administered and National Forest System lands could reduce the threat on these lands. However, in areas with scattered federal landownership, infrastructure may be routed around federal lands, often increasing its length and potential impact. ROW avoidance and exclusion areas on BLM-administered and National Forest System lands could increase this tendency.

Impact Analysis. **Table 5-2** lists the areas of ROW avoidance and exclusion in GRSG habitat by alternative. **Table 5-3** lists acres of PHMA and GHMA in existing utility corridors.

Table 5-2
Acres of Rights-of-Way Designations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open to Rights-of-Way				
Alternative A	371,500	99%	4,343,000	95%
Alternative B	24,000	0%	209,000	0%
Alternative C	25,000	0%	209,000	0%
Alternative D	24,000	0%	209,000	0%
Alternative E	24,000	0%	209,000	0%
Alternative F	24,000	0%	209,000	0%
Proposed Plan	53,000	55%	286,000	27%
Right-of-Way Exclusion				
Alternative A	118,000	93%	271,000	94%
Alternative B	3,808,000	>99%	271,000	94%
Alternative C	8,198,000	>99%	15,000	0%
Alternative D	368,000	>99%	21,000	29%
Alternative E	118,000	93%	271,000	94%
Alternative F	3,808,000	>99%	4,404,000	>99%
Proposed Plan	118,000	93%	270,000	95%
Right-of-Way Avoidance				
Alternative A	1,734,000	0%	20,000	0%
Alternative B	1,734,000	0%	4,153,000	>99%
Alternative C	1,734,000	0%	20,000	0%
Alternative D	5,412,000	68%	4,165,000	>99%
Alternative E	5,424,000	68%	4,153,000	>99%
Alternative F	1,734,000	0%	20,000	0%
Proposed Plan	5,395,000	68%	4,077,000	>99%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within ROW designations in MZ III; it also displays the percentage of those acres that are found within the sub-region.

Table 5-3
Acres of Existing Utility Corridors in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Alternative A	325,000	92%	427,000	96%
Alternative B	325,000	92%	427,000	96%
Alternative C	120,000	79%	0	0%
Alternative D	329,000	92%	423,000	96%
Alternative E	325,000	92%	427,000	96%
Alternative F	325,000	92%	427,000	96%
Proposed Plan	61,000	59%	77,000	77%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within existing utility corridors in MZ III; it also displays the percentage of those acres that are found within the sub-region.

In general, the three ROW designations discussed below – exclusion, avoidance, and open – will provide differing levels of protection to GRSG and its habitat. Exclusion will provide the highest level of habitat protection, while avoidance may provide less protection, and open has the least amount of protection. See the *Glossary* for full definitions of exclusion, avoidance, and open.

Across MZ III, Alternative A (current management) leaves the most acres of GRSG habitat open to ROW/SUAs. Alternatives C and F would both reduce acres open to ROWs and contribute the most acres of ROW exclusion of all the action alternatives, making them the most protective of GRSG and its habitat. Alternative B also contributes substantially to ROW exclusion within PHMA, though not as much as Alternatives C and F. Alternative E and the Proposed Plan would not contribute as many acres of ROW exclusion as the alternatives above. For Alternative E, all proposed ROWs within the SGMA would trigger SETT consultation, and the associated avoid, minimize, and mitigate strategy. Measures in the Proposed Plan, including applying disturbance screening criteria, RDFs (consistent with applicable law), buffers, mitigation, and the disturbance cap, would reduce impacts on GRSG relative to Alternative A.

Alternatives D and E and the Proposed Plan would contribute the most acres of ROW avoidance within MZ III. These alternatives would increase protection to GRSG and its habitat compared to Alternative A, but to a lesser extent than Alternative F, which manages all GRSG habitat as ROW exclusion, and Alternative C, which manages all PHMA and ACECs as ROW exclusion.

Because Alternatives C and F would manage the most GRSG habitat as exclusion, these alternatives would likely provide the highest level of protection

to GRSG and its habitat and would be most likely to meet the COT report objective, which is to avoid development of infrastructure in GRSG priority areas for conservation.

The numbers of ROW authorizations are anticipated to grow in the sub-region. Increasing populations, continued energy development, and new communication sites drive the need for new ROWs on both federal and non-federal lands. For instance, the TransWest Express project would impact GRSG habitat in MZ III. While this project would be exempted from the conservation measures in this plan, conservation measures for GRSG will be incorporated via the project's site-specific NEPA process. Additionally, this project will be in compliance with BLM Instruction Memorandum 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures, which requires that GRSG habitat is maintained or enhanced through avoidance, minimization, and applying compensatory mitigation. Actual impacts and contribution to cumulative effects from these projects are unknown at this time.

ROW impacts on GRSG habitat on state or private land could be greater due to less restrictive management on those lands. However, it is likely that impacts would be reduced, since new ROW authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in the SGMA under both the Nevada and Utah state conservation plans for GRSG. These stipulations would benefit the GRSG and its habitat by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from ROWs developments.

The effect of the alternatives and other conservation actions in the MZ (most notably the Nevada state plan and Utah executive order) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other important seasonal habitats that do not follow geopolitical boundaries.

Reasonably foreseeable ROW development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as the Utah BLM and Forest Service LUPA in MZ III would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future ROW developments would be further reduced. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ III by providing the greatest amount of ROW exclusion in GRSG habitat. The

Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site ROWs with the least impact on GRSG habitat.

Renewable Energy: Wind and Solar

Nature and Type of Effects. Impacts on GRSG from renewable energy development, such as that for wind and solar power, are similar to those from nonrenewable energy development. Additional concerns associated with wind energy developments are rotor blade noise, structure avoidance, and mortality caused by collisions with rotating blades (Connelly et al. 2004).

Conditions in the Sub-region and in MZ III. Wind energy development is an increasing threat to some populations across the GRSG range. Currently, nine ROW applications for wind testing or development are under NEPA review within the sub-region and/or MZ III (see **Table 5-1**). One utility-scale wind farm in the sub-region was in the planning stage but is currently temporarily deferred pending the release of the Nevada and Northeastern California GRSG LUPA/EIS; however, the proposed location is in MZ IV, within the Northern Great Basin GRSG population. No commercial-scale wind developments have been authorized or constructed in MZ III.

No current solar energy facilities measurably affect GRSG within its range (Manier et al. 2013, p. 66). The southern portion of GRSG range, including within MZ III, has higher solar energy generation potential than the rest of the GRSG range, indicating that given potential technological developments within the lifespan of this analysis, solar potential across the southern range of GRSG, including within MZ III, may become attractive to solar development projects (Manier et al. 2013, p. 66). There are currently two utility-scale solar projects in NEPA review in MZ III.

Geothermal energy development is discussed under *Energy Development and Mining*, below.

Impact Analysis. **Table 5-4** lists areas of wind energy ROW by alternative.

The Nevada and Northeastern California Sub-region alternatives would all reduce acres of GRSG habitat open to wind ROWs relative to Alternative A. Acres of GRSG habitat managed as wind exclusion would be the greatest under Alternatives C, D, and F, reducing potential impacts on GRSG and its habitat the most under these Alternatives.

The No Action Alternative would leave the most GRSG habitat open to wind ROWs, and would thereby have the greatest potential impact on GRSG and its habitat. Alternative E would not exclude these projects from GRSG habitat, but they would trigger SETT consultation and be subject to the avoid, minimize, and mitigate strategy in the Nevada state plan. Under the Proposed Plan, PHMA would be managed as exclusion for commercial wind facilities. GHMA would be

Table 5-4
Acres of Wind Energy Management Designations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open to Wind Rights-of-Way				
Alternative A	3,693,000	>99%	4,327,000	96%
Alternative B	3,000	0%	193,000	0%
Alternative C	3,000	0%	193,000	0%
Alternative D	3,000	0%	193,000	0%
Alternative E	3,000	0%	193,000	0%
Alternative F	3,000	0%	193,000	0%
Proposed Plan	3,000	0%	193,000	0%
Wind Right-of-Way Exclusion				
Alternative A	1,873,000	6%	273,000	94%
Alternative B	5,564,000	68%	273,000	94%
Alternative C	9,953,000	82%	17,000	0%
Alternative D	5,802,000	70%	4,169,000	>99%
Alternative E	1,873,000	6%	273,000	94%
Alternative F	5,564,000	68%	4,407,000	>99%
Proposed Plan	5,564,000	68%	273,000	94%
Wind Right-of-Way Avoidance				
Alternative A	0	0%	0	0%
Alternative B	0	0%	4,134,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	3,690,000	100%	4,134,000	100%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	4,134,000	100%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within wind energy management designations in MZ III; it also displays the percentage of those acres that are found within the sub-region.

ROW avoidance for wind facilities. Wind developments would also be subject to the anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs (consistent with applicable law), buffers, and a mitigation requirement. The Proposed Plan would reduce potential impacts on GRSG relative to the No Action Alternative but not to the extent of other alternatives, including Alternatives C, D, and F, which would manage the most GRSG habitat as wind ROW exclusion.

New ROW authorizations that require state agency review or approval would be subject to stipulations for development in the SGMA under the Nevada and Utah state conservation plan as discussed under *Rights-of-Way*, above.

The effect of the alternatives and other conservation actions in the MZ (most notably the Nevada state plan and Utah executive order) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other seasonal habitats that do not follow geopolitical boundaries.

Reasonably foreseeable energy development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as wind energy restrictions in the Utah BLM and Forest Service LUPA in MZ III would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future energy developments would be further reduced. Alternatives C, D, and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ III by providing the greatest amount of wind exclusion in GRSG habitat. The Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site energy developments with the least impact on GRSG habitat.

Livestock Grazing and Free Roaming Equids

Nature and Type of Effects. In general, livestock can influence habitat by modifying plant biomass, plant height and cover, and plant species composition. As a result, livestock grazing could cause changes in habitat that alter species abundances and composition in GRSG insect prey. Changes in plant composition could occur in varying degrees and could change vegetative structure, affecting cover for nesting birds. Grazing could also alter fire regimes (Davies et al. 2010).

If not managed properly, cattle and sheep grazing can compact soil, remove biological soil crusts, enrich soil with nutrients, reduce vegetation cover and diversity, and trample nests, directly disturbing GRSG and negatively affecting

GRSG recruitment. Cattle and sheep may reduce invertebrate prey for GRSG or increase GRSG exposure to predators (Beck and Mitchell 2000, pp. 998-1,000; Knick 2011; Coates 2007, pp. 28-33). Grazing in riparian areas can destabilize stream flows and streambanks, cause the loss of riparian shade, and increase sediment and nutrient loads in the aquatic ecosystem (George et al. 2011). Stock watering tanks and troughs can contribute to stream and aquifer dewatering and may concentrate livestock movement and congregation in sensitive areas (Vance and Stagliano 2007); they also may contribute to the increased occurrence of West Nile virus (Walker and Naugle 2011). Stock watering tanks and troughs can cause GRSG mortality if not equipped with escape ramps or covers.

Even periodic improperly managed grazing can damage range resources over the long term. Grazing often exacerbates drought effects when stocking levels are not quickly reduced to match the limited forage production. The degree to which grazing affects habitat depends on several factors, such as the number of animals grazing in an area, the time of grazing, and the grazing system used.

However, targeted grazing can reduce seed production and populations of cheatgrass, if applied annually. The timing of the livestock grazing is critical, however, or else the livestock will consume the remnant native species along with the invasive annual grasses (BLM 2002c). Targeted livestock grazing also can be used to reduce fuel load (Davies et al. 2011; Davies et al. 2010; Connelly et al. 2004, pp. 7, 28-30), which can influence the behavior and effects of fire in sagebrush steppe and semi-desert systems under moderate or better weather conditions (Davies et al. 2010; Strand et al. 2014). As fire weather conditions become extreme, the potential role of grazing on fire behavior decreases.

Light to moderate grazing does not appear to affect perennial grasses, which are important to nesting cover (Strand and Launchbaugh 2013; BLM 1997d). However, excessive grazing can eliminate perennial grasses and lead to expansion of invasive species such as cheatgrass or medusahead (Reisner et al. 2013).

A well-developed understory of native grass, forbs, and sagebrush is critical for GRSG and other wildlife. Impacts on habitat vary with livestock densities and distribution; the more evenly livestock is distributed across the landscape, the lower its impact on any given area (Gillen et al. 1984). However, cattle show a strong preference for certain areas, leading to high use in some areas and little to no use in others. Livestock grazing is generally limited by slopes of greater than 30 percent, dense forests and vegetation, poor or little upland forage, and lack of water.

Since the passage of the 1934 Taylor Grazing Act, range conditions on BLM-administered lands have improved due to improved grazing management practices and decreased livestock numbers and annual duration of grazing. On

National Forest Systems lands, livestock grazing is administered in accordance to a number of laws and regulations, including the Multiple Use and Sustained Yield Act of 1960, Granger-Thye Act of 1950, and Organic Administration Act of 1897. As with BLM-administered lands, the Forest Service issues livestock grazing permits for a period of up to 10 years that are generally renewable if it is determined that the terms and conditions of the permit are being met and the ecological condition of the rangelands are meeting the fundamentals of rangeland health.

Although livestock grazing is the most widespread land use across the sagebrush biome, it exerts a different extent and influence on soils and vegetation than land uses that remove or fragment habitat (e.g., mineral extraction or infrastructure development). Livestock grazing influences vegetation by applying ongoing selective pressure, affecting perennial plant condition, competition, and composition (Connelly et al. 2004). Moreover, shifts in plant communities (i.e., exotic annual grass invasion and western juniper encroachment), caused in large part from historical improper (unmanaged) grazing, and cannot be easily reversed through changes to grazing systems or long-term rest from grazing (Strand et al. 2014). Thus, simply reducing AUMs or acres open to grazing would not necessarily restore high-quality GRSG habitat. However, if inappropriate grazing is occurring, restoring properly managed grazing practices, including potentially reducing AUMs, could result in higher quality GRSG habitat.

Reducing grass height caused by livestock grazing in GRSG nesting and brood-rearing habitat has been shown to negatively impact nesting success. Livestock grazing could reduce the suitability of breeding and brood-rearing habitat, which would impact GRSG populations (USFWS 2010a).

For BLM-administered lands, Standards for Rangeland Health require the BLM to ensure that the environment contains all of the necessary components to support viable populations of sensitive, threatened, and endangered species in a given area relative to site potential. Where livestock grazing results in a level of forage use (utilization levels) determined to have detrimental effects on GRSG habitat quality, changes in grazing management that will improve or restore habitat quality will be made as soon as practical but no later than the start of the next grazing year pursuant to 43 CFR 4180.2(c). Examples of changes in management that should be considered include temporary livestock exclusion (rest); permanent livestock exclusion; change in the season, duration, or intensity of use; fencing; and changes in salting and/or watering locations.

Barbed-wire fences contribute to direct mortality of GRSG through fence collisions (Stevens et al. 2011) and may contribute to predation by acting as perches for raptors (Braun 1998). Additional habitat modifications associated with grazing management are mechanical and chemical treatments to increase grass production, often by removing sagebrush (Knick et al. 2011). Standards for Rangeland Health protect habitat from elements detrimental to GRSG, but as

discussed above, not all rangelands in MZ III are in compliance with these standards.

Invertebrate numbers have been positively correlated with quality of herbaceous understory in sagebrush habitat (Hull et al. 1996; Jamison et al. 2002), suggesting that managing grazing through either stocking rates (Van Poolen and Lacey 1979) or seasonal pasture rests (Mueggler 1950; Laycock 1978; Owens and Norton 1990) to increase herbage production could benefit nesting GRSG and chick survival during early brood rearing by maintaining or increasing invertebrate food sources for GRSG chicks.

Grazing infrastructure, including spring developments, water tanks and troughs, can attract livestock to previously undisturbed habitat areas. Water developments have increased the amount of sagebrush habitat available to livestock grazing by the virtue of transporting and providing water in areas where it was previously unavailable (Connelly et al. 2004). This may expand livestock grazing impacts on greater areas of sagebrush habitat, particularly uplands important for GRSG nesting, early brood rearing, and wintering (Manier et al. 2013, p. 101). High stocking rates in water-poor areas and the associated congregation of cattle around water developments are particularly detrimental to vegetation immediately surrounding the water source (Hall and Bryant 1995; Dobkin et al. 1998), potentially reducing the available summer food source for GRSG. GRSG likely do not regularly use livestock water developments in summer range, but instead obtain required moisture from succulent vegetation (Connelly et al. 2004). Water developments designed to provide water to adjacent succulent vegetation may benefit GRSG by providing additional summer food sources; however, these types of water developments also provide additional breeding grounds for mosquitos that carry West Nile virus (see additional discussion below), which can breed in water-filled hoof prints (Walker and Naugle 2011). Congregating cattle may also increase local impacts on GRSG, including nest trampling and desertion (Beck and Mitchell 2000).

Riparian areas and wet meadows used for brood rearing are especially sensitive to grazing by livestock (Beck and Mitchell 2000, Hockett 2002). Summer grazing in wet meadows and riparian areas can lead to reduced low-vegetative forb growth that comprise essential GRSG summer diets (Manier et al. 2013, p. 99), compromised hydrology, reduction of suitable summer habitat for GRSG, and GRSG avoidance of these areas (Beck and Mitchell 2000).

Water developments may contribute to the increased occurrence of West Nile virus by providing suitable breeding areas for mosquitos that carry the virus (Walker and Naugle 2011). GRSG are highly susceptible to West Nile virus and suffer high rates of mortality (Clark et al. 2006; McLean 2006); the disease has been implicated in several GRSG die-offs in the Oregon Sub-region (**Section 4.2**). The primary vector of West Nile virus in sagebrush ecosystems is the mosquito *Culex tarsalis* (Naugle et al. 2004; Naugle et al. 2005; Walker and

Naugle 2011). The species is dependent on the availability of warm pools of water for larval development. Artificial water sources may facilitate the spread of West Nile virus within GRSG habitats because these water developments support abundant populations of *C. tarsalis* and provide suitable breeding habitat for longer temporal periods than natural, ephemeral water sources (Walker and Naugle 2011).

Because water developments attract other animals besides livestock, they may serve as predator “sinks” for GRSG; Connelly and Doughty (1989) observed that female GRSG with broods tended to avoid water developments more than males, potentially to reduce exposure and vulnerability to predation.

As discussed, fences increase collision risk for GRSG (Stevens et al. 2011) and provide perches for predators, making them a potential cause of direct mortality to GRSG (Braun 1998). Fences also contribute to habitat fragmentation (USFWS 2010a). Thus, fencing associated with livestock water developments, if present, may contribute to additional negative impacts on GRSG.

Impacts from wild horse and burro grazing can be similar to those from unmanaged livestock grazing, and can include impacts on riparian areas, water quality, soil and streambank erosion, and GRSG nest trampling and abandonment. Wild horses and burros also have impacts on vegetation; because of physiological differences, a horse consumes 20 to 65 percent more forage than a cow of equivalent body mass (Connelly et al. 2004). Comparison of sagebrush sites both occupied and unoccupied by wild horses has shown several notable differences, including overall reduced vegetative cover and shifted species composition (Beever and Aldridge 2011), reduced sagebrush canopy cover, increased fragmentation of shrub canopy, reduced total number of plant species (species richness), and increased soil compaction (Bartmann et al. 1987). At higher elevations only, forb cover may be higher in areas grazed by horses (Beever 1999; Beever et al. 2003). Where wild horses and burros co-occur with cattle, the total amount of habitat that remains ungrazed by nonnative grazers will be diminished as the free-roaming equids will separate themselves spatially from cattle, using steeper slopes and higher elevations (Connelly et al. 2004).

Horses also represent a unique grazing disturbance in sagebrush ecosystems comparable to neither cattle nor native ungulates (Beever 2003) because of their non-uniform use of the landscape, as well as their management status (horses are not hunted, fenced, or seasonally rotated between pastures). Further, horses are one of the least selective grazers in the GRSG range (Hanley and Hanley 1982), meaning that fewer plant species may remain ungrazed in occupied areas (Beever 2003). Due to physiological differences, horses trim vegetation more closely to the ground and can delay recovery of plants (Menard et al. 2002). Further, effects of wild horse grazing may be magnified in dry years (Beever and Brussard 2000) or during periods of drought or vegetation stress

(NTT 2011). Effects will be further exacerbated by wild horse and burro populations that exceed AML.

Water must also be available year-round for wild horse and burro use in HMAs and wild horse territories (Wild and Free-Roaming Horses and Burros Act of 1971). This can result in riparian areas receiving yearlong use by wild horses and burros, which contributes to degradation of these systems. Management to protect riparian areas with additional water developments and fencing can lead to detrimental impacts on GRSG as described above.

Conditions in the Sub-region and in MZ III. Livestock grazing is present and widespread on many land types, such as federal and private, across MZ III. Rangeland health assessments have found that approximately 17 percent of BLM-administered grazing allotments in GRSG habitat in MZ III are not meeting wildlife standards with grazing as a causal factor (Manier et al. 2013, p. 97).

Perhaps the most pervasive change associated with grazing management in GRSG habitats throughout MZ III is the construction of fencing and water developments (Knick et al. 2011, p. 224).

Approximately 4 million acres of GRSG habitat within MZ III is federally managed wild horse and burro range (Manier et al. 2013, p. 102). Within MZ III, nearly 25 percent of priority habitat and 41 percent of general habitat is negatively influenced by free-roaming equids (Manier et al. 2013, p. 102). The BLM manages 61 Herd Management Areas (HMAs) and the Forest Service manages 12 active Wild Horse and Burro Territories (WHBTs) in the sub-region (**Section 3.6**). Wild horse and burro populations in HMAs and WHBTs are managed to achieve and maintain established AMLs and corresponding forage allocations (AUMs).

Impact Analysis. On all lands in the sub-region, the BLM manages livestock grazing on 21.4 million acres, encompassing approximately 725 grazing allotments. The Forest Service manages an additional 225 grazing allotments (**Section 3.8**). **Table 5-5** lists the acres of PHMA and GHMA available and unavailable for grazing in MZ III by alternative.

Acres available to livestock grazing in PHMA are similar to Alternative A across most alternatives, with the exception of Alternatives C and F. Alternative C would manage PHMA as closed to grazing. Alternative F would reduce AUMs and acres available to grazing by 25 percent. The Nevada and Northeastern California Sub-region contains most of the acres of GRSG habitat available to grazing within MZ III. Acres unavailable to livestock grazing would be greatest under Alternative C, which closes all PHMA to grazing. Such a closure would benefit GRSG by maintaining nesting cover for protection and forage; however, the increased need for fencing to exclude grazing animals could also harm nesting GRSG by increasing the likelihood of predation and fence collision.

Table 5-5
Acres Available and Unavailable to Livestock Grazing in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Available to Livestock Grazing				
Alternative A	5,526,000	69%	4,618,000	95%
Alternative B	5,526,000	69%	4,618,000	95%
Alternative C	1,728,000	0%	241,000	0%
Alternative D	5,763,000	70%	4,381,000	94%
Alternative E	5,526,000	69%	4,618,000	95%
Alternative F	5,526,000	69%	4,618,000	95%
Proposed Plan	5,526,000	69%	4,618,000	95%
Unavailable to Livestock Grazing				
Alternative A	0	0%	0	0%
Alternative B	0	0%	0	0%
Alternative C	8,175,000	100%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA available and unavailable to livestock grazing in MZ III; it also displays the percentage of those acres that are found within the sub-region.

However, as discussed, light to moderate grazing is compatible with GRSG habitat; thus, simply closing acres to grazing may not itself benefit or harm GRSG. Possibly equally or more beneficial is restricting range improvements in GRSG habitat, providing seasonal rests from grazing pressure, limiting fencing, and effectively implementing range health standards on grazing allotments in GRSG habitat. Alternatives B through F and the Proposed Plan include grazing restrictions (to varying degrees), which would help protect GRSG from potential impacts such as habitat changes due to herbivory and collisions with fencing. In terms of impacts on BLM-administered and National Forest System lands, Alternative A would have the least GRSG-specific protective grazing restrictions, and would therefore have the greatest impacts on the species. Alternative C would have no areas available for livestock within with PHMA, and would therefore have the fewest direct impacts on the species. However, as a result of restricting grazing in GRSG habitat under Alternative C, increased fencing to exclude cattle may occur. This could result in higher cumulative effects through mortality from fencing collisions. Alternatively, removal of

livestock fencing on BLM-administered and National Forest System lands may lead to increased grazing-related impacts on riparian areas from free-roaming equids (discussed below).

Additionally, the lack of grazing within GRSG habitat could lead to fuel buildup in native bunchgrass habitats, leading to higher probability of bunchgrass mortality during wildfire and lower resistance to invasion or dominance by annual grasses post-fire (Balch et al. 2012). The loss of permittee/lessee invasive plant control partnerships under Alternative C could further contribute to an increase in the spread of invasive annual grasses. Reduced grazing under Alternative F would have similar, but fewer impacts, compared to Alternative C.

Under the Proposed Plan, livestock grazing management would be improved by managing for GRSG habitat objectives (**Table 2.2**), adaptive management, and range improvements to benefit GRSG. Processing of grazing permits/leases and land health assessments would be prioritized in PHMA, which would lead to improved grazing management and reduced impacts on GRSG in the highest-quality habitat for the species.

The COT report objectives for livestock grazing are to manage grazing in a manner consistent with local ecological conditions. This management would maintain or restore healthy sagebrush shrub and native perennial grass and forb communities and conserve essential habitat components for GRSG. Restoration to meet these standards and adequate monitoring would be required. The COT report also states that land managers should avoid or reduce the impact of range management structures on GRSG habitat.

If BLM-administered and National Forest System lands were made unavailable or if livestock grazing were reduced, as under Alternatives C and F, this could increase grazing pressure on adjacent private lands, especially where land ownership patterns are mixed. Loss of federal grazing permits would pose a threat of indirect adverse effects, including potential conversion of private grazing lands to agriculture, if the loss of federal grazing rights made ranching less economically viable.

Since 2010, the NRCS SGI has enhanced rangeland health through rotational grazing systems, revegetating former rangeland with sagebrush and perennial grasses and control of invasive weeds. On privately owned lands, SGI has developed a prescribed grazing approach that balances forage availability with livestock demand. This system allows for adjustments to timing, frequency, and duration of grazing, ensuring rangelands are managed sustainably to provide continued ecological function of sagebrush-steppe. A primary focus of the prescribed grazing approach is maintenance of key plant species, such as deep-rooted perennial grasses that have been shown to be essential for ecological resistance to invasive annual grasses (Reisner et al. 2013, pp. 1047-1048). These actions help to alleviate the adverse impacts associated with improper grazing

practices outlined above under *Nature and Type of Effects*. Within MZ III, SGI has implemented 37,557 acres of prescribed grazing systems and marked 10 miles of fences within MZ III. This program is likely the largest and most impactful program on private lands within MZ III. Because of its focus on priority areas for conservation, which often overlap PHMA, the SGI's past, present, and reasonably foreseeable work has had and likely will continue to have a cumulative beneficial impact on GRSG when considered alongside protective BLM and Forest Service management actions in PHMA.

Reasonably foreseeable livestock grazing management efforts in MZ III are expected to increase over the analysis period (**Section 5.1.16**), through increased NRCS conservation actions under the Sage-Grouse Initiative (e.g., fence marking and conservation easements), state efforts to maintain ranchland, and the implementation of the Utah BLM and Forest Service LUPA in MZ III. When grazing management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

Under all alternatives the BLM has the authority to adjust wild horse and burros AMLs if resource damage occurs; however, only Alternatives B through F and the Proposed Plan provide management guidelines specific to GRSG habitat (e.g., prioritizing gathers in GRSG habitat under Alternatives B and D, or reducing AMLs by 25 percent in GRSG habitat under Alternative F), which would benefit the species more than Alternative A. Under most action alternatives, range improvements for wild horses and burros would follow management action for livestock range improvements and be aligned with GRSG habitat objectives. Wild horse and burro management, including fencing riparian areas, round ups, and sterilization to manage populations at AMLs, could have indirect impacts on GRSG and its habitat as described above.

Reasonably foreseeable wild horse management efforts are projected to increase over the analysis period (**Section 5.1.16**) with implementation of the Utah BLM and Forest Service LUPA in MZ III. When wild horse management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III. Impacts may be reduced to the greatest extent under the Proposed Plan, where AMLs would be evaluated with consideration of GRSG habitat objectives for BLM-administered lands.

Conversion to Agriculture

Nature and Type of Effects. Converting sagebrush habitat to agricultural use causes direct loss of habitat available for GRSG. Habitat loss also decreases the connectivity between seasonal habitats, increasing population isolation and fragmentation. Fragmentation then increases the probability for decline of the population, reduced genetic diversity, and extirpation from stochastic events (Knick and Hanser 2011).

In addition to reducing the land area available to support GRSG, habitat loss and fragmentation also increase the likelihood of other disturbances, such as human activity, wildfire, predators, and invasive plant spread.

Conversion to cropland has generally eliminated or fragmented sagebrush on private lands in areas with deep fertile soils or irrigation potential. Sagebrush remaining in these areas has been limited to the agricultural edge or to relatively unproductive environments.

Conditions in the Sub-region and in MZ III. Regional assessments estimate that while less than 1 percent of priority habitat and general habitat in MZ III are directly influenced by agricultural development, 81 and 71 percent of priority habitat and general habitat, respectively, are within approximately 4 miles of agricultural land and are therefore negatively indirectly affected (Manier et al. 2013, p. 27).

Impact Analysis. The BLM and Forest Service do not convert public lands to tilled agriculture. As such, the only direct authority these agencies have over conversion to agriculture is by retaining or disposing of lands via the lands and realty program. Lands retained under BLM and Forest Service management will not be converted to agriculture, and disposing of lands could increase the likelihood they will be converted to tilled agriculture, depending on their location and new management authority. The COT report objectives for converting land to agriculture are to avoid further loss of sagebrush habitat for agricultural activities and to prioritize restoration.

As shown below in **Table 5-6**, acres of GRSG habitat identified for retention across MZ III are similar across all action alternatives with the exception of Alternative C, which would contribute to approximately twice the amount of PHMA retained as the other alternatives. All action alternatives with the exception of Alternative E would identify zero acres of PHMA for disposal (i.e., would retain all PHMA); Alternative E would have no change in disposal of PHMA from the No Action Alternative. For GHMA, all alternatives would identify similar amounts for disposal; however, no GHMA would be identified for disposal under Alternative D. Under the action alternatives, the BLM and Forest Service would generally retain GRSG habitat, thereby eliminating the possibility that GRSG habitat would be converted to agriculture use. Current land tenure retention guidance include retaining lands supporting threatened and endangered species and species of high interest, and existing California BLM field office RMPs and PMU conservation strategies specify retention of GRSG habitat, which would mean that GRSG habitat would be retained under the No Action Alternative on California lands and under Alternative D for the sub-region. Alternatives B, C and F and the Proposed Plan specifically consider GRSG habitat in land tenure retention, which would meet the COT objective for agricultural conversion. Beneficial impacts on GRSG would likely be greatest

Table 5-6
Acres Identified for Retention and Disposal in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Acres Identified for Retention				
Alternative A	5,486,000	68%	4,401,000	95%
Alternative B	5,566,000	68%	4,401,000	95%
Alternative C	9,956,000	82%	0	0%
Alternative D	5,804,000	70%	4,395,000	95%
Alternative E	5,486,000	68%	4,401,000	95%
Alternative F	5,566,000	68%	4,401,000	95%
Proposed Plan	5,566,000	68%	4,401,000	95%
Acres Identified for Disposal				
Alternative A	80,000	100%	235,000	100%
Alternative B	0	0%	231,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	80,000	100%	231,000	100%
Alternative F	0	0%	231,000	100%
Proposed Plan	0	0%	231,000	100%

Source: BLM 2015

This table displays the acres of PHMA and GHMA identified for retention and disposal in MZ III; it also displays the percentage of those acres that are found within the sub-region.

under the Proposed Plan, which would retain GRSG habitat unless there is a net conservation gain or no adverse impacts from disposal. Furthermore, under the Proposed Plan, GRSG habitat on private lands would be actively located and targeted for acquisition, and if acquired, managed as either PHMA or GHMA.

Land tenure adjustments require site-specific NEPA analysis, and land sales must meet the disposal criteria under applicable law. BLM and Forest Service land tenure adjustments are not anticipated to be a significant contributing element to the threat of agricultural conversion.

The NRCS SGI program focuses on maintaining ranchland that provides habitat for GRSG. This voluntary program provides private landowners with monetary incentives to protect GRSG habitat, often through conservation easements. As a result, private land containing GRSG habitat is protected from conversion to agriculture or other development for the life of the conservation agreement. The conservation easements and other conservation incentives such as

restoration of water features and fence marking can enhance the ability of private ranchlands to support GRSG. As of 2014, SGI has secured conservation easements on 11,191 acres within MZ III and marked or removed 10 miles of fence (NRCS 2015). This has preserved habitat and reduced the risk of direct mortality on these lands.

Additional actions within the sub-region include agricultural restoration or modification for benefit of GRSG, including establishing upland brood-rearing habitat, or “brood strips.” Upland brood strips are areas established to maximize insect and forb production for young gallinaceous birds, including GRSG.

Over the analysis period, conversion to agriculture is expected to increase (**Section 5.1.16**), though state and private conservation efforts as well as the Utah BLM and Forest Service LUPA in MZ III would reduce the threat. When land tenure decisions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in net conservation gain to GRSG habitats and populations in MZ III.

Energy Development and Mining

The COT report states that energy development should be designed to ensure that it will not impinge on stable or increasing GRSG population trends. For mining, the COT report objective is to maintain stable to increasing GRSG populations and no net loss of GRSG habitats in areas affected by mining (USFWS 2013a, p. 49).

There are approximately 1,580,100 acres of GRSG habitat in MZ III where energy and mineral development (including oil, gas, geothermal, coal, mineral materials, and nonenergy leasable minerals) is presently occurring. There are 7,028,600 acres indirectly influenced by energy development (including oil, gas, coal, and mineral materials; indirect effects were not quantified for geothermal and nonenergy leasable mineral developments) (Manier et al. 2013, pp. 52-71).

Oil and Gas

Nature and Type of Effects. As discussed in **Section 4.2**, oil and gas development impacts GRSG and sagebrush habitats through direct disturbance and habitat loss from well pads, access construction, seismic surveys, roads, power lines, and pipeline corridors. Indirect disturbances result from noise, vehicle traffic, gaseous emissions, changes in water availability and quality, and human presence. These factors could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005) or influence habitat quality, predator communities, and disease dynamics (Naugle et al. 2011).

Conditions in the Sub-region and in MZ III. There is relatively little oil and gas development within MZ III. Approximately 2,000 acres of PHMA are directly impacted throughout the MZ (Manier et al. 2013, p. 52), and approximately

571,000 acres (4 percent) of GRSG habitat are leased but undeveloped (Manier et al. 2013, p. 55). There are two oil-producing basins in the sub-region and in MZ III: Railroad Valley in Elko County, Nevada and Pine Valley in Eureka County, Nevada (**Section 3.13**).

Oil development-related wells on BLM-administered lands indirectly influence 38 percent of priority habitat and 80 percent of general habitat across MZ III, occurring to a distance of 12 miles from the development. Private surface lands account for 40 percent of indirect effects in priority habitat and 17 percent in general habitat in MZ III (Manier et al. 2013, p. 52). The Forest Service does not have any direct or indirect effects within this MZ. Thus, actions on BLM-administered lands within MZ III have a somewhat greater potential to ameliorate effects from oil and gas development than do similar conservation actions on private lands.

Although oil and gas activities have a disproportionately greater effect on private lands due to lack of BLM or Forest Service regulatory oversight, regulatory mechanisms on both federal surface and split-estate lands in MZ III would be influential should fluid mineral development occur. Split-estate lands with federal subsurface minerals may provide mitigation for impacts on GRSG habitat on private surface lands that would not otherwise be required on lands with both privately held surface and subsurface.

According to the Reasonably Foreseeable Development scenario (**Appendix P**), permanent disturbance associated with oil and gas development is projected to occur on 1,246 acres within the sub-region over the next 20 years (though only 128 acres of permanent disturbance will remain after reclamation is applied to temporarily disturbed areas), representing less than 1 percent of GRSG habitat within either the sub-region or MZ III. The potential for impacts would be reduced where areas are closed to fluid mineral leasing and where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law (**Appendix D**), the likelihood for impacts on GRSG habitat on BLM-administered and National Forest System lands is anticipated to be small and localized under all alternatives.

Impact Analysis. **Table 5-7** and **Table 5-8** provide a quantitative summary of fluid mineral leasing conditions on BLM-administered and National Forest System lands across MZ III, followed by an analysis of the Nevada and Northeastern California Sub-region alternatives.

As shown in **Tables 5-7** and **5-8**, fluid mineral closures and stipulations within the Nevada and Northeastern California Sub-region exert a fairly large influence on closures or stipulations within MZ III as a whole. Alternatives C and F would close the greatest amount of GRSG habitat to new fluid mineral leasing and would be the most protective of GRSG and its habitat. As such, reasonably

Table 5-7
Acres Open and Closed to Fluid Mineral Leasing in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open ¹ to Fluid Mineral Leasing				
Alternative A	3,690,000	100%	4,264,000	97%
Alternative B	0	0%	4,264,000	97%
Alternative C	0	0%	129,000	0%
Alternative D	0	0%	129,000	0%
Alternative E	0	0%	129,000	0%
Alternative F	0	0%	129,000	0%
Proposed Plan	0	0%	129,000	0%
Closed to Fluid Mineral Leasing				
Alternative A	164,000	67%	274,000	93%
Alternative B	3,854,000	99%	274,000	93%
Alternative C	8,244,000	99%	18,000	0%
Alternative D	414,000	87%	24,000	25%
Alternative E	164,000	67%	274,000	93%
Alternative F	3,854,000	99%	4,407,000	>99%
Proposed Plan	164,000	67%	274,000	93%

Source: BLM 2015

¹Open with standard stipulations. This table displays the acres of PHMA and GHMA open and closed to fluid mineral leasing in MZ III; it also displays the percentage of those acres that are found within the sub-region.

Table 5-8
Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
NSO Stipulations				
Alternative A	2,001,000	0%	33,000	0%
Alternative B	2,001,000	0%	33,000	0%
Alternative C	2,001,000	0%	33,000	0%
Alternative D	5,680,000	65%	4,179,000	99%
Alternative E	2,001,000	0%	33,000	0%
Alternative F	2,001,000	0%	33,000	0%

Table 5-8
Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Proposed Plan	5,692,000	65%	33,000	0%
CSU/TL Stipulations				
Alternative A	0	0%	71,000	0%
Alternative B	0	0%	71,000	0%
Alternative C	0	0%	71,000	0%
Alternative D	0	0%	71,000	0%
Alternative E	3,690,000	100%	4,205,000	98%
Alternative F	0	0%	71,000	0%
Proposed Plan	0	0%	4,205,000	98%

Source: BLM 2015

This table displays the acres of PHMA and GHMA with NSO Stipulations and CSU/TL Stipulations in MZ III; it also displays the percentage of those acres that are found within the sub-region.

foreseeable future leasing projects would be less likely to impact GRSG populations on federal lands. Alternative D and the Proposed Plan would stipulate NSO within PHMA. This would reduce well density and impacts associated with construction and operation. The Proposed Plan would impose major constraints on the greatest amount of PHMA, and minor constraints on the greatest amount of GHMA. The Proposed Plan would provide additional protections to GRSG from fluid mineral development by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, buffers, mitigation requirements, and RDFs consistent with applicable law. Though Alternative E would not close GRSG habitat to new fluid mineral leasing, all new leases within the SGMA would be subject to SETT consultation for application of the avoid, minimize, and mitigate process under the Nevada state plan.

All BLM and Forest Service Proposed Plans within MZ III include RDFs (consistent with applicable law) to minimize impacts on GRSG from oil and gas development on federal lands. In areas where mineral estate is currently unleased, these tools can be applied to future leases; in areas that are already leased, RDFs consistent with applicable law can be applied as conditions of approval for development of existing leases. Examples include locating new compressor stations outside of PHMA to reduce noise disturbance; clustering operations and facilities as closely as possible; placing infrastructure in already disturbed locations where the habitat has not been fully restored; and restoring disturbed areas at final reclamation to the pre-disturbance landforms and desired plant communities. State plans contain similar measures to reduce impacts. Together, these measures would help protect unfragmented habitats,

minimize habitat loss and fragmentation, and maintain conditions that meet GRSG life history needs. Recent research indicates that restored habitats lack many of the features sought by GRSG in their habitat areas and may not support GRSG for long periods following restoration activities. In order to conserve GRSG populations on the landscape, protecting existing habitat through minimizing development would provide the chance for GRSG persistence (Arkle et al. 2014).

Reasonably foreseeable oil and gas development is limited in the MZ. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, the impact would be a net conservation gain due in large part to implementation of NSO stipulations, anthropogenic disturbance caps, and adaptive management that would minimize future disturbances to GRSG populations and habitats.

New leasing authorizations that require state agency review or approval would be subject to stipulations for development in the SGMA under the Nevada and Utah state plans. These stipulations would benefit GRSG and its habitat by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from fluid mineral developments.

The effect of the Nevada and Northeastern California LUPA alternatives and other past, present, and reasonably foreseeable future management actions in the MZ (most notably the Nevada and Utah executive orders) could be synergistic, meaning that the effects of the actions together is greater than the sum of their individual effects. For example, applying buffers in PHMA and on state and private land would effectively conserve larger blocks of land than if these actions occurred individually. This would provide a landscape-scale net conservation gain, especially in areas where little development has occurred to date.

Reasonably foreseeable oil and gas development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**). State and private GRSG conservation efforts as well as actions in the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ III by providing the greatest amount of GRSG habitat closed to leasing. The Proposed Plan would also reduce the threat to a lesser degree through designation of NSO stipulations and additional conservation measures.

Geothermal

Nature and Type of Effects. Impacts on GRSG from geothermal development are similar to oil and gas development, and direct impacts on habitats would occur from development of power plants, access roads, pipelines, and transmission lines. As a result, impacts of geothermal developments on GRSG from direct habitat loss, habitat fragmentation via roads and transmission lines, noise, and increased human presence (Connelly et al. 2004) may be similar to those discussed for nonrenewable energy development. Comparable effects on local GRSG populations are also anticipated (Manier et al. 2013, p. 70). Other concerns related to geothermal energy development include air and water pollution, disposal of hazardous waste, land subsidence, and release of toxic gases into the environment (Manier et al. 2013, p. 70).

Conditions in the Sub-region and MZ III. Geothermal energy development potential is particularly high throughout MZ III; approximately 7,984,500 acres of BLM-administered GRSG habitat in the sub-region is open to geothermal leasing (**Section 3.13**). However, existing geothermal leases directly affect only 125,600 acres (less than 1 percent) of GRSG habitat in the MZ (Manier et al. 2013, p. 71).

The Required Foreseeable Development scenario for the Nevada and Northeastern California Sub-region (**Appendix P**) predicts up to 12 new geothermal power plants and estimates between 53 and 367 acres of disturbance would be required for each plant. Therefore, between 636 and 4,404 acres of temporary and permanent disturbance associated with geothermal development over the next 20 years is expected under the No Action Alternative throughout the sub-region on both BLM-administered and National Forest System lands. The conservative assumption that all 4,404 acres of disturbance would be located within MZ III, on PHMA, would mean that less than 1 percent of PHMA within MZ III would be directly affected under this scenario. It is reasonable to assume that not all 4,404 acres of disturbance would occur within GRSG habitat; however, indirect impacts from such development would affect a considerably larger area than the direct footprint of development, as discussed for several threats above. Typical geothermal development includes roads, transmission lines, and associated linear features in addition to power plant development, and as discussed above, these features may contribute to spread of invasive plants, habitat fragmentation, and increased predation on GRSG. Some of this acreage would be reclaimed after operations are ceased or wells are abandoned.

Impact Analysis. Under the RFD scenario for the action alternatives, estimated disturbance would generally decrease between 0 and 70 percent, relative to the No Action Alternative, above. The potential for impacts would be reduced where areas are closed to fluid mineral leasing and where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law (**Appendix D**), the likelihood for impacts on

GRSG habitat is anticipated to be small and localized under all alternatives, including the No Action Alternative.

The quantitative analysis of effects from geothermal leasing would be the same as described for oil and gas because allocations and past, present, and reasonably foreseeable future actions would be the same.

Coal

Nature and Type of Effects. Coal mining and the use of coal to produce electricity has environmental impacts. These include soil erosion, dust, noise, water pollution, acid-mine drainage, and air emissions, in addition to impacts on wildlife in the area. Burning coal releases toxic fumes and particulate matter into the atmosphere and contributes to climate change (Manier et al. 2013, pp. 69-71). Development of surface mines and associated infrastructure (such as roads and power lines), noise, and human activity may negatively impact GRSG numbers (Braun 1998).

Besides oil and natural gas development, past, present, and reasonably foreseeable future coal extraction has been and continues to be a major mining activity within GRSG habitats range-wide (Braun 1998). Coal potential is high in eastern areas (Utah) of MZ III (Manier et al. 2013, p. 132), indicating that development of coal resources could affect already isolated GRSG populations in Utah.

Conditions in MZ III. While coal potential and development within the GRSG range is generally high and widespread within MZs I, II, and VII, potential for coal within the Great Basin region is generally lower. However, coal potential is high in eastern areas (Utah) of MZ III (Manier et al. 2013, p. 132), especially within the Carbon and Emery GRSG population areas. All mining in these two population areas is currently underground, and no potential for surface mining exists within these population areas. The Alton Coal Tract project is an existing surface coal mine within the Panguitch population in Utah that may put the Alton-Sink Valley population of GRSG at risk of displacement or extirpation (USFWS 2012b); proposed expansion of this project would also be underground. Approximately 36 percent of BLM-administered priority habitat in MZ III and 1 percent of priority habitat on National Forest System lands are influenced by coal mining (Manier et al. 2013, p. 74). Coal mining does not directly or indirectly affect general habitat in MZ III. There are no leasable coal deposits in the Nevada and Northeastern California Sub-region (**Section 3.13**).

Impact Analysis. Because there are no leasable coal deposits in the Nevada and Northeastern California Sub-region, coal leasing decisions were not carried forward in the alternatives (Chapter 2). Therefore, none of the alternatives would have a cumulative influence on GRSG populations or habitat within MZ III portions of the Nevada and Northeastern California Sub-region. Coal

operations in Utah would continue to have a minor cumulative influence on GRSG populations within other portions of MZ III.

Reasonably foreseeable coal development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts and the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by restricting the location of developments and requiring mitigation. Though the Nevada and Northeastern California LUPA does not contain coal leasing decisions, implementation of other BLM and Forest Service Proposed Plans in MZ III would result in a net conservation gain to GRSG habitats and populations.

Mineral Materials

Nature and Type of Effects. Development of surface mines (for sand, gravel, and other common mineral materials found in MZ III) may negatively impact GRSG numbers and disrupt the habitat and life-cycle of the species, similar to other types of mining activities (Braun 1998; Manier et al. 2013, pp. 70-71).

Conditions in the Sub-region and in MZ III. There are 1,140,200 acres of mining and mineral materials disposal sites (not including minerals mined as energy sources) on BLM-administered surface land on priority habitat and general habitat in MZ III; sites on BLM-administered lands contribute 77 percent of potential influence on priority habitat and 79 percent of potential influence on general habitat (Manier et al. 2013, p. 77). National Forest System lands contribute 8 and 9 percent of potential influence on priority habitat and general habitat, respectively, while private lands contribute 13 and 11 percent of influence on priority habitat and general habitat, respectively. Indirect effects are estimated to 1.5 miles out from the direct effects area (Manier et al. 2013, p. 77).

The mineral materials currently being developed for commercial purposes in the sub-region include sand and gravel, crushed stone, dimension stone, and common clays. Occurrence potential for these resources and other mineral materials spans the states of California and Nevada, with heavier concentrations on the northern half of Nevada (**Section 3.13**).

Across MZ III, priority habitat and general habitat are most affected by mining and mineral materials disposal sites on BLM-administered lands. GRSG may be directly impacted, being in the path of development; however, indirect impacts on habitat affect a much larger area than direct impacts. In total, 40 percent of priority habitat and 40 percent of general habitat influenced by the indirect impact of mining and mineral materials disposal sites in MZ III are on BLM-administered land (Manier et al. 2013, p. 77), suggesting that management of mining and material disposal sites on BLM-administered land would have the greatest impact on GRSG habitat conditions relative to actions on private and/or state lands should mineral development occur.

Impact Analysis. **Table 5-9** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open and closed to mineral material disposal across MZ III.

Table 5-9
Acres Open and Closed to Mineral Material Disposal in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open to Mineral Material Disposal				
Alternative A	3,691,000	>99%	4,415,000	94%
Alternative B	1,000	0%	4,415,000	94%
Alternative C	1,000	0%	281,000	0%
Alternative D	1,000	0%	281,000	0%
Alternative E	3,691,000	>99%	4,415,000	94%
Alternative F	1,000	0%	4,415,000	94%
Proposed Plan	1,000	0%	4,415,000	94%
Closed to Mineral Material Disposal				
Alternative A	2,167,000	5%	280,000	91%
Alternative B	5,857,000	65%	280,000	91%
Alternative C	10,247,000	80%	23,000	0%
Alternative D	6,095,000	65%	4,175,000	99%
Alternative E	2,167,000	5%	280,000	91%
Alternative F	5,857,000	65%	280,000	91%
Proposed Plan	5,857,000	65%	280,000	91%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open and closed to mineral material disposal in MZ III; it also displays the percentage of those acres that are found within the sub-region.

Under Alternative A, most public lands within the sub-region are open to mineral material disposal. Specific closures of areas to mineral materials such as ACECs or crucial or essential wildlife habitat exist throughout the sub-region; however, this alternative provides the least protection to GRSG populations or habitat. Under Alternatives B, C, D, and F and the Proposed Plan, PHMA would generally be managed as closed to mineral material disposal. Under Alternative D, GHMA would also be closed to mineral material disposal; Alternative D may provide the greatest protection to GRSG and its habitat by closing PHMA and GHMA to mineral materials disposal. Under Alternative E, GRSG habitat would not be closed to mineral materials disposal; rather, the net conservation gain of GRSG habitat due to anthropogenic disturbances goal of the Nevada state plan

would apply, along with the associated “avoid, minimize, mitigate” process. Acres closed in GHMA would be similar across most alternatives, though Alternative D would have the greatest acres of GHMA closed.

The Proposed Plan would close PHMA to new mineral materials sales, though PHMA would remain open to expansion of existing pits. GHMA would remain open under the Proposed Plan. While the Proposed Plan would not contribute as many acres of GRSG habitat closed to mineral material disposal as Alternative D, the Proposed Plan would provide additional protections to GRSG habitat from mineral material development by requiring anthropogenic disturbance screening criteria, a 3 percent disturbance cap, RDFs consistent with applicable law, buffers, and mitigation. These closures and restrictions would reduce the effect on GRSG habitat from mineral material development on BLM-administered and National Forest System lands in MZ III for most action alternatives. However, these actions may shift development onto non-federal lands, with potentially greater impacts on GRSG and its habitat. This is because similar protective stipulations and permit requirements might not apply on those other lands.

New mineral material disposal authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in the SGMA under the Nevada and Utah state conservation plan. These stipulations would benefit the GRSG and its habitat by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from mineral material disposal. These stipulations would be of particular benefit on privately owned surface and subsurface lands, where BLM and Forest Service protective regulatory mechanisms do not apply.

Reasonably foreseeable mineral materials development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts and the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

Locatable Minerals

Nature and Type of Effects. Locatable minerals include gold, silver, uranium, and bentonite. Activities associated with locatable mineral development, such as stockpiling topsoil and extracting and transporting material, would cause mortality and nest disruption. These actions also would reduce the functionality of the surrounding habitat with noise and light disturbance, resulting in lost and degraded GRSG habitat.

As with fluid mineral development, reclamation practices may help to reduce long-term impacts on GRSG and its habitat. Although disturbed areas have not been restored to near pre-disturbance conditions in the past, more recent efforts since 1980 have been directed toward restoring functional habitat. Future reclamation would be focused on restoring habitats capable of supporting viable GRSG populations. Even with effective restoration, however, restored areas may not support GRSG populations at the same level as prior to disturbance.

Conditions in the Sub-region and in MZ III. The primary locatable minerals in commercially viable quantities in the Nevada and Northeastern California Sub-region are gold, silver, and copper. Uranium deposits are also found in eastern MZ III (Finch 1996), though none are currently developed. Manier et al. (2013) did not separate the analysis of existing conditions in the MZ for locatable minerals and mineral materials; therefore, the existing conditions for locatable minerals is included in the discussion for *Mineral Materials*, above.

Impact Analysis. **Table 5-10** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open and recommended for withdrawal from mineral entry across MZ III.

Table 5-10
Acres Open and Recommended for Withdrawal from Locatable Mineral Entry
in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open to Locatable Mineral Entry				
Alternative A	5,772,000	65%	4,448,000	95%
Alternative B	2,007,000	0%	4,448,000	95%
Alternative C	2,007,000	0%	229,500	0%
Alternative D	5,844,000	66%	4,376,000	95%
Alternative E	5,772,000	65%	4,448,000	95%
Alternative F	2,007,000	0%	4,448,000	95%
Proposed Plan	5,766,000	65%	4,445,000	95%
Recommended for Withdrawal from Locatable Mineral Entry				
Alternative A	4,000	0%	0	0%
Alternative B	3,768,000	>99%	0	0%
Alternative C	7,986,000	>99%	0	0%
Alternative D	4,000	0%	0	0%
Alternative E	4,000	0%	0	0%

Table 5-10
Acres Open and Recommended for Withdrawal from Locatable Mineral Entry
in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Alternative F	3,768,000	>99%	0	0%
Proposed Plan	4,000	0%	0	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open to mineral entry and recommended for withdrawal from locatable mineral entry in MZ III; it also displays the percentage of those acres that are found within the sub-region.

Under Alternative A, all lands are generally open to mineral location, and while there are specific locatable mineral withdrawals for particular ROWs, designated wilderness areas, ACECs and other administrative needs, there are no locatable mineral withdrawals specific to protecting GRSG habitat. Impacts on GRSG populations and habitat would be greatest under Alternative A. Mitigation of effects on GRSG and its habitat are identified through the NEPA process to approve plans of operation. Impacts under Alternative D would be the same as Alternative A; therefore, Alternative D would not provide any net conservation gain to GRSG compared to Alternative A.

Under Alternatives B, C, and F, PHMA would be recommended for withdrawal. These alternatives would increase restrictions and limitations for locatable minerals management in GRSG habitat and would thus provide conservation gains to GRSG relative to Alternative A, particularly Alternative C. Under Alternative E, all lands would generally remain open to locatable minerals as under Alternative A; however, a net conservation gain of GRSG habitat due to anthropogenic disturbances goal of the Nevada state plan would apply to locatable minerals management, along with the associated “avoid, minimize, mitigate” permitting process.

Subject to valid existing rights and applicable law, the Proposed Plan would provide additional protections to GRSG from locatable mineral development by applying 43 CFR 3809 standards and requiring anthropogenic disturbance criteria, RDFs, buffers, and mitigation. Under the Proposed Plan, abandoned mine sites in GRSG habitat would be restored by eliminating physical structures that could provide nesting and/or perching sites for predators. These closures and restrictions would reduce the effect on GRSG from mineral material development on BLM-administered and National Forest System lands in MZ III for most action alternatives. However, these actions may shift development onto non-federal lands, with potentially greater impact on GRSG. This is because similar protective stipulations and permit requirements might not apply on those other lands.

New locatable mineral authorizations that require state agency review or approval would be subject to the State permitting process and stipulations for development in the SGMA under both the Nevada and Utah state conservation plans for GRSG. These stipulations would benefit GRSG and its habitat by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from locatable mineral management. These stipulations would be of particular benefit on privately owned surface and subsurface lands, where BLM and Forest Service protective regulatory mechanisms do not apply.

Reasonably foreseeable locatable mineral development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by applying RDFs as Conditions of Approval. The disturbance caps in the Proposed Plans would not be applied to block locatable mineral entry projects subject to valid existing rights and applicable law, but any locatable mineral entry would be considered as disturbance under the cap. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

Nonenergy Leasable Minerals

Nonenergy leasable minerals are materials such as sulfates, silicates, and trona (sodium carbonate). Impacts on GRSG are similar to those from other types of mining.

Conditions in the Sub-region and in MZ III. Existing leases for nonenergy leasable minerals represent a relatively small threat spatially, as 57,400 acres (less than 1 percent) of GRSG habitats in MZ III are directly affected by existing prospecting permits (Manier et al. 2013, p. 71). Identified solid leasable minerals in the Nevada and Northeastern California Sub-region include potassium and sodium. Within the sub-region there are 3,660 acres of approved nonenergy leasable leases and prospecting permits; however, none of these permits are located within priority or general habitat. There are currently eleven pending prospecting permits totaling over 22,000 acres in the sub-region on priority habitat or general habitat (**Section 3.13**).

Impact Analysis. **Table 5-11** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open and closed to nonenergy leasable mineral leasing across MZ III.

Alternatives B, C, D, and F and the Proposed Plan would increase the acreage of PHMA closed to nonenergy leasing compared to current management (Alternative A) and Alternative E. The alternatives would provide fewer protections in GHMA, with the exception of Alternative D which would

Table 5-11
Acres Open and Closed to Nonenergy Leasable Mineral Leasing in GRSG Habitat in MZ III

	PHMA		GHMA	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open to Nonenergy Leasing				
Alternative A	3,690,000	100%	4,421,000	94%
Alternative B	0	0%	4,421,000	94%
Alternative C	0	0%	287,000	0%
Alternative D	0	0%	287,000	0%
Alternative E	3,690,000	100%	4,421,000	94%
Alternative F	0	0%	4,421,000	94%
Proposed Plan	0	0%	4,421,000	94%
Closed to Nonenergy Leasing				
Alternative A	2,175,000	5%	273,000	94%
Alternative B	5,865,000	65%	273,000	94%
Alternative C	10,255,000	80%	17,000	0%
Alternative D	6,103,000	66%	4,169,000	>99%
Alternative E	2,175,000	5%	273,000	94%
Alternative F	5,865,000	65%	273,000	94%
Proposed Plan	5,865,000	65%	273,000	94%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open and closed to nonenergy leasing in MZ III; it also displays the percentage of those acres that are found within the sub-region.

increase the acreage of GHMA closed to leasing. Because they would close the greatest amount of GRSG habitat to nonenergy mineral leasing, Alternatives C and D would be the most protective of GRSG and its habitat. The Proposed Plan would provide additional protections compared to the other action alternatives by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, buffers, RDFs consistent with applicable law, and mitigation.

Reasonably foreseeable nonenergy leasable mineral development in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**). However, state and private GRSG conservation efforts as well as the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by providing additional protections such as disturbance caps, RDFs, and mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

Recreation

Nature and Type of Effects. Recreation such as camping, bicycling, wildlife viewing, horseback riding, fishing, and hunting can be dispersed; concentrated, such OHV use and developed campsites; and permitted, such as via BLM Special Recreation Permit and Forest Service Recreation Special Use Authorization (RSUA). The BLM also manages Special Recreation Management Areas (SRMAs) where recreation is a primary resource management consideration.

Recreation on federally administered lands that use the extensive network of double-track and single-track routes have an impact on sagebrush and GRSG. Ecological impacts of roads and motorized trails are mortality due to collisions; behavior modifications due to noise, human activity, and habitat loss; alteration of the physical environment; nutrient leaching; erosion; invasive plants spread; increased use; and alteration by humans due to accessibility (Knick et al. 2011, p. 219). Generally, road-effect distances (the distance from a road at which a population density decrease is detected) are positively correlated with increased traffic density and speed (Foreman and Alexander 1998). Recreational activities can degrade GRSG habitat through direct impacts on vegetation and soils, introduction or spread of invasive species, and habitat fragmentation. This occurs in areas of concentrated use, trailheads, staging areas, and routes and trails. However, road access is critical to facilitate fire suppression response, thereby preserving intact vegetation and preventing further fragmentation.

Motorized activities, including OHV use, are expected to have a larger footprint on the landscape. They are anticipated to have the greatest level of impact due to noise levels, compared to nonmotorized uses, such as hiking or equestrian use. Cross-country motorized travel, which is permitted in designated areas on BLM-administered lands but not National Forest System lands, would increase the potential for soil compaction, perennial grasses and forbs loss, and reduction in sagebrush canopy cover. Losses in sagebrush canopy could be the result of repeated, high-frequency, cross-country OHV use over long periods. In addition, the chances of wildfire are increased during the summer, when fire dangers are high and recreation is at its highest.

Dispersed uses expand the human footprint. Closing areas to recreation and reclaiming unused, minimally used, or redundant roads in and around sagebrush habitats during seasonal use by GRSG may reduce the footprint and presumably impacts on wildlife. Restricting access to important habitat areas during seasonal GRSG use (lekking, nesting, brood-rearing, and wintering) may decrease the impacts associated with humans. However, access restriction will not eliminate other impacts, such as invasive plant spread, predator movements, cover loss, and erosion (Manier et al. 2013, p. 108).

Conditions in the Sub-region and in MZ III. Human populations have increased and expanded, primarily over the past century and in the western portion of the sagebrush distribution (Knick et al. 2011, p. 212). With these expanding

populations come greater human impacts (Leu et al. 2008). Uninhabited areas within the Great Basin ecoregion (MZs III and V) decreased 90 percent (from 22.2 million acres to less than 3 million acres) with expansion driven in part by economic and recreation opportunities in the region (Torregrosa and Devoe 2008, p. 10).

In the Nevada and Northeastern California Sub-region, travel management planning is complete for all National Forest System lands and lands managed by BLM California Field Offices (**Section 3.10**).

Impact Analysis. **Table 5-12** shows Acres of Travel Management Designations in GRSG Habitat in MZ III.

The COT report objectives for recreation are to maintain healthy native sagebrush communities, based on local ecological conditions, and to manage direct and indirect human disturbance (including noise) to avoid interruption of normal GRSG behavior (USFWS 2013a, p. 49). Limits on road use under the action alternatives and limits on OHVs would help meet these objectives.

Table 5-12
Acres of Travel Management Designations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
Open				
Alternative A	3,432,000	100%	3,571,000	100%
Alternative B	0	0%	3,571,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%
Limited				
Alternative A	2,094,000	16%	874,000	74%
Alternative B	5,526,000	68%	874,000	74%
Alternative C	9,744,000	82%	227,000	0%
Alternative D	5,598,000	69%	4,373,000	95%
Alternative E	5,526,000	68%	4,445,000	95%
Alternative F	5,526,000	68%	4,445,000	95%
Proposed Plan	5,527,000	68%	4,445,000	95%

Table 5-12
Acres of Travel Management Designations in GRSG Habitat in MZ III

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ III	Percent Within Sub-Region	MZ III	Percent Within Sub-Region
		Closed		
Alternative A	42,000	86%	187,000	92%
Alternative B	42,000	86%	187,000	92%
Alternative C	214,000	97%	15,000	0%
Alternative D	209,000	97%	21,000	29%
Alternative E	42,000	86%	187,000	92%
Alternative F	42,000	86%	187,000	92%
Proposed Plan	42,000	86%	187,000	92%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within travel management designations of open, limited and closed in MZ III; it also displays the percentage of those acres that are found within the sub-region.

As shown in **Table 5-12**, there are slight variations among the action alternatives in acres closed and limited to motorized vehicles in both PHMA and GHMA; however, Alternatives C and D would close the most acres of PHMA, and Alternative C would designate the most acres of PHMA as limited. All action alternatives would close PHMA to cross-country motorized travel, and Alternatives D, E, F, and the Proposed Plan would similarly restrict acres of open GHMA. As a result of travel management planning, impacts on GRSG from recreational motorized vehicle use would be greatest under Alternative A; impacts would be reduced most under Alternatives C, D, and the Proposed Plan.

For recreation, Alternatives B and D and the Proposed Plan would aim to reduce impacts on GRSG with issuance of SRPs and RSUAs. Alternative F would take a similar approach, but with the addition of seasonal restrictions within 4 miles of active leks. Alternative E would require SETT consultation upon issuance of SRPs/RSUAs within GRSG habitat to avoid, minimize, and mitigate impacts on GRSG consistent with the Nevada state plan. These alternatives would have the greatest potential benefits to GRSG and its habitat by incorporating specific GRSG-related management. Alternatives A and C would not manage recreation to reduce impacts on GRSG, and may therefore have the greatest impact on GRSG and its habitat.

Reasonably foreseeable recreation in MZ III is expected to increase over the 20-year analysis period (**Section 5.1.16**). However, state and private GRSG conservation efforts as well as the Utah BLM and Forest Service Proposed Plan in MZ III would reduce the threat by providing additional protections such as disturbance caps and limitations on National Forest System lands. When

restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ III.

5.1.7 Existing Conditions in WAFWA MZ IV

This section summarizes existing conditions and past and present actions for the Nevada and Northeastern California Sub-region (provided in more detail in **Chapter 3**) and for MZ IV as a whole. Reasonably foreseeable future actions are discussed in **Section 5.1.9**.

GRSG Habitat and Populations

MZ IV consists of nine GRSG populations: Baker, East-Central, Southwest Montana, Snake-Salmon-Beaverhead, Belt Mountains, Weiser, Northern Great Basin, Box Elder, and Sawtooth (Garton et al. 2011). The Nevada and Northeastern California Sub-region includes a portion of the Northern Great Basin population. This zone represents one of the largest areas of connected GRSG habitat, as demonstrated by Knick et al. (2011), and supports the largest population of GRSG outside of the Wyoming Basin (Garton et al. 2011). MZ IV includes GRSG populations in Oregon, Idaho, Nevada, Utah, and Montana.

In MZ IV, BLM-administered and other federal lands account for approximately 22,522,300 million acres of GRSG habitat (approximately 68 percent of habitat), with state and private lands accounting for over 10 million acres of GRSG habitat (approximately 31 percent of habitat) (Manier et al. 2013, p. 118). The BLM also has some management authority over split-estate lands, with BLM-administered federal mineral estate and privately held surface ownership. The higher percentage of GRSG habitat on BLM-administered and other federal land means BLM and Forest Service management could play a key role in alleviating threats to GRSG in MZ IV.

Table 5-13 provides a breakdown of land ownership and acres of GRSG habitat in MZ IV. As the table shows, approximately 52 percent of priority habitat and 19 percent of general habitat is on BLM-administered lands. Approximately 7 percent of priority habitat and 5 percent of general habitat is on National Forest System lands.

Table 5-13
Management Jurisdiction in MZ IV by Acres of Priority and General Habitats

	Total Surface Area (Acres)	Priority Habitat (Acres)	General Habitat (Acres)	Non-habitat (Acres)
MZ IV	78,259,200 (100%)	21,930,600 (28%)	10,958,500 (14%)	45,370,100 (58%)
BLM	26,220,300 (34%)	13,710,700 (63%)	4,928,200 (45%)	7,581,400 (17%)
Forest Service	22,291,600 (28%)	1,613,800 (7%)	1,113,500 (10%)	9,564,300 (21%)

Table 5-13
Management Jurisdiction in MZ IV by Acres of Priority and General Habitats

	Total Surface Area (Acres)	Priority Habitat (Acres)	General Habitat (Acres)	Non-habitat (Acres)
Tribal and other federal	2,431,000 (3%)	633,600 (3%)	522,500 (5%)	1,274,900 (3%)
Private	23,150,400 (30%)	4,890,200 (22%)	3,516,700 (32%)	14,743,500 (33%)
State	3,681,000 (5%)	1,019,400 (5%)	846,200 (8%)	1,815,400 (4%)
Other	484,800 (<1%)	62,900 (<1%)	31,400 (<1%)	390,500 (1%)

Source: Manier et al. 2013, p. 118

Population Trends in Management Zone IV

Historic disturbances to the sagebrush landscape, including conversion of habitat to agriculture, wildfire, invasive plants, and development, have resulted in a residual sagebrush landscape that is less intact and productive than those prior to European colonization. As a result, more known populations in the region are relatively small and/or separated from adjacent populations. Notable exceptions are the Snake-Salmon-Beaverhead and Northern Great Basin populations (Manier et al. 2013, p. 132). Garton et al. (2011) predicted a 10.5 percent chance this MZ will fall below 200 males by 2037, and a 39.7 percent chance it would fall below 200 males by 2107 (USFWS 2013a, p. 75).

The Snake-Salmon-Beaverhead and Northern Great Basin populations encompass the largest number of occupied leks in the sub-region. The Northern Great Basin population is especially important to long-term conservation of GRSG in MZ IV. This is because it comprises a substantial portion of the Great Basin core population (Connelly et al. 2004); located in the states of Idaho, Nevada, Utah, and Oregon, this is one of the two remaining major population strongholds in the range of the species. The Snake-Salmon-Beaverhead population provides additional and substantial population contributions within Idaho and known connectivity with the Southwest Montana population. Conversely, MZ IV also contains less resilient populations at higher risk of extirpation (USFWS 2013a). The Baker population is the smallest extant population in the state of Oregon and has little connectivity with other populations due to habitat and topography barriers.

In Montana, the GRSG population changes cyclically. For example, the GRSG population in Montana declined sharply from 1991 to 1996, before increasing through 2000 (Montana Sage-Grouse Working Group 2005). The population is thought to be down 33 percent from historic levels. Between 2004 and 2013, the average number of displaying males per lek in a given year in Montana ranged from 7 to 19 (Greater Sage-Grouse Habitat Conservation Advisory Council 2014).

5.1.8 Regional Efforts to Manage Threats to GRSG

Regional efforts include past, present, and reasonably foreseeable actions conducted by the BLM and by other federal and/or in cooperation with non-federal agencies, organizations, landowners, or other groups in MZ IV. These efforts may have a strong influence in alleviating threats to GRSG than BLM and Forest Service actions alone. This is because state and private lands account for approximately 10 million acres (approximately 31 percent) of GRSG habitat in MZ IV (Manier et al. 2013, p. 118). The boundaries of MZ IV encompass portions of the states of Idaho, Montana, Utah, Nevada, Oregon, and Wyoming. Regional efforts occurring in these states are also discussed below.

Other BLM and Forest Service Planning Efforts

The BLM and Forest Service have incorporated management of SFAs into their proposed management approach for GRSG, as described in **Section 5.1.4**. There are three SFAs comprising 7,886,000 acres in MZ IV as a whole. The North-Central Idaho SFA (2,629,400 acres) and the Southern Idaho/Northern Nevada SFA (4,198,900 acres) are entirely within MZ IV. The Southeast Oregon/North-Central Nevada SFA is mostly within MZ IV (1,057,700 acres) though a 683,200-acre portion is within MZ V.

Other BLM and Forest Service planning efforts are described in **Section 5.1.4**.

Idaho Statewide Efforts

Similar to efforts in nearby states, the governor of Idaho is expected to issue an executive order providing direction for GRSG conservation in Idaho on state lands. This executive order is expected to be largely consistent with BLM and Forest Service direction in the GRSG LUPs, though exact details are not known and are speculative as of the time this Final EIS was published.

Idaho Department of Lands prepared the Proposed Greater Sage-Grouse Conservation Plan (IDL 2015). Released in February 2015, and complementing Idaho Governor Otter's Proposed Plan (Alternative E of the Draft Idaho and Southwest Montana LUPA/EIS), the draft plan focuses on three primary threats to GRSG in Idaho: wildfire, infrastructure, and invasive species. The plan outlines enforceable stipulations in leases, permits, and easements on IDL lands. Conservation measures in the plan will be used as RDFs (consistent with applicable law) for activities supporting fire prevention, suppression, and rehabilitation, regulating oil and gas development, some mining activities, and abandoned mine reclamation. While the plan is composed of voluntary management guidelines, the guidelines may be used by state regulatory agencies for projects requiring agency review or approval.

The Idaho Sage-grouse Advisory Committee prepared their Conservation Plan for the Greater Sage-grouse in Idaho (Idaho Sage-grouse Advisory Committee 2006) to provide guidance, tools, and resources to GRSG Local Working Groups, and to facilitate and provide statewide consistency between Local

Working Group plans. The plan identifies 19 threats to GRSG and GRSG habitat and presents conservation measures to address each of those threats. Rural Fire Protection Districts have been established within the state to help suppress fires in GRSG habitat and to facilitate development of their local plans.

Montana Statewide Efforts

The Montana Department of Fish, Wildlife and Parks (MFWP) is tasked with implementing the range-wide WAFWA Sage-Grouse Strategy (Stiver et al. 2006) in Montana. The WAFWA Sage-Grouse Strategy monitors, researches, provides outreach, and funds conservation projects for GRSG. A basic premise of the WAFWA Sage-Grouse Strategy is that additional conservation capacity must be developed at all local, state, federal, and range-wide levels for both the short term (3 to 5 years) and for the long term (10 years or more) to ensure GRSG conservation.

In addition, the MFWP's Montana Management Plan and Conservation Strategy for Sage-Grouse was initiated in 2005 to protect, maintain, and restore GRSG habitat. The plan ranks threats to the species across the state and provides an overall strategy for public and private cooperation in conservation actions. In 2013, the governor established the Greater Sage-Grouse Habitat Conservation Advisory Council to provide recommendations on policies and actions for GRSG conservation and provide regulatory authority for conservation actions. The council provided these recommendations in January 2014. The governor subsequently issued an executive order on September 9, 2014 (State of Montana 2014), based on the council recommendations that provided the direction for future GRSG conservation in Montana.

Montana Executive Order. The Montana governor issued an executive order on September 9, 2014 (State of Montana 2014), based on the council recommendations that provided the direction for GRSG conservation in Montana. Stipulations for development in the executive order and Montana Management Plan and Conservation Strategy for Sage-Grouse include but are not limited to:

- A 0.6-mile NSO buffer around the perimeter of active leks for new activities
- Locating new overhead power lines and communication towers a minimum of 0.6 mile from the perimeter of active leks
- A minimum 2.0-mile buffer from active lek perimeters for main roads and a minimum 0.6-mile buffer for facility site access roads
- A 5 percent limit on anthropogenic surface disturbance within the Density and Disturbance Calculation Tool examination area (based upon suitable habitat)
- As authorized by permitting agency or agencies, activities (production, maintenance and emergency activity exempted), will

typically be prohibited from March 15 through July 15 outside of the NSO perimeter of an active lek and within 2 miles of that perimeter in Core Population Areas where breeding, nesting, and early brood-rearing habitat is present

Montana's plan will apply a disturbance cap in core habitat and will limit well density and apply timing limitations. The 0.6-mile buffer would protect males in the vicinity of leks during the breeding season; the density limits and disturbance cap would protect GRSG during nesting, brood-rearing, and winter concentration activities. The timing restrictions would reduce the potential for displacement or disruption during the breeding season.

Utah Statewide Efforts

Utah statewide efforts are described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ III.

Oregon Statewide Efforts

The Oregon Department of Fish and Wildlife (ODFW). ODFW has developed a strategy to promote conservation of GRSG and intact, functioning GRSG habitats in Oregon. The *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat* (Oregon State Plan, Hagen 2011) describes the ODFW's proposed management of GRSG. It also provides guidance to public land management agencies and land managers for GRSG conservation. GRSG conservation guidelines in the State Plan are designed to maintain (at a minimum) or enhance the quality (the optimum) of current habitats. They will also assist resource managers in achieving the population and habitat objectives of the State Plan.

The Oregon State Plan provides biological recommendations for long-term conservation of GRSG in Oregon based on the best available science; however, implementing recommendations is the responsibility of the respective land manager. Thus, the intent of the Oregon State Plan is plan is to inform decision-makers regarding the biological consequences of various actions on GRSG, but not to dictate land management decisions. Similarly, GRSG conservation proposed in the plan is voluntary on private lands (Hagen 2011, p. viii).

The Oregon State Plan establishes "Core Areas" to help delineate landscape planning units by distinguishing areas of high biological value to GRSG. These areas are based on the locations of breeding areas and are intended to help balance GRSG habitat requirements with development, which would be subject to stipulations and regulations (Hagen 2011, p. 80). ODFW developed Core Areas necessary to conserve 90 percent of Oregon's GRSG population with emphasis on highest density and important use areas that provide for breeding, wintering, and connectivity corridors.

While the plan is composed of voluntary management guidelines, the guidelines may be used by state regulatory agencies, including the Energy Facility Siting

Council as conditions of approval on a case-by-case basis for certain energy projects. For example, the council has jurisdiction on wind energy projects greater than 105 MW (Dave Budeau, phone conversation with author, March 26, 2015).

Further, the Oregon Governor's natural resources department is currently in the process of developing regulations for GRSB conservation. The forthcoming Sage Grouse Conservation Action Plan will supplement the state plan and provide land use regulations and mitigations for Oregon core habitat areas (Dave Budeau, phone conversation with author, March 26, 2015).

Oregon Candidate Conservation Agreements (CCA) and Candidate Conservation Agreements with Assurances (CCAA). CCAs are voluntary agreements between the USFWS and one or more parties (including federal agencies) to address the conservation needs of species at risk of being listed under the ESA. CCAAs are similar, though these voluntary agreements are made between the USFWS and non-federal landowners. One CCA and several CCAAs are currently in place or will soon be implemented that will cover the entire GRSB range in the state of Oregon. Under these agreements and the associated Enhancement of Survival permit issued under the ESA, landowners would voluntarily undertake management activities on their properties to enhance, restore, or maintain habitat benefiting GRSB, in exchange for assurances that they would not be subject to increased land use restrictions should GRSB become listed under the ESA in the future. The agreements have a term of 30 years, and can be renewed upon expiration. Management activities would be guided by a Site Specific Plan (SSP), a unique management plan developed to address threats to GRSB on a particular allotment or property and that are approved by USFWS. As of April 2015, over 2.7 million acres of GRSB habitat in Oregon are either enrolled or pending enrollment under such agreements; the amount of GRSB habitat enrolled is expected to rise as the GRSB listing decision nears (Jeff Everett, Email to author, April 16, 2015).

GRSB Programmatic Candidate Conservation Agreement for Rangeland Management Practices on BLM Lands in Oregon. In cooperation with the BLM and USFWS, the Oregon Cattlemen's Association developed a Programmatic Candidate Conservation Agreement (Programmatic CCA) to reduce or eliminate negative impacts of rangeland management practices to GRSB and to maintain and support livestock grazing practices that are beneficial or neutral to GRSB on enrolled allotments administered by the BLM in Oregon. The Programmatic CCA covers approximately 10.2 million acres of GRSB habitat on BLM grazing allotments in southeast Oregon; however, not all these lands may eventually be enrolled in the programmatic CCA (USFWS 2013b). As of April 2015, BLM has received 65 written requests for development of an SSP and enrollment in the CCA. The written requests represent 121 allotments covering more than 1.9 million acres (Jeff Everett, Email to author, April 16, 2015).

Harney County Programmatic CCAA. After implementation of the Programmatic CCA described above, Oregon's Harney County Soil and Water Conservation District developed a programmatic CCAA for private lands in the county (USFWS 2013c). The covered area encompasses all GRSG habitat on non-federal lands in Harney County, Oregon and on some lands immediately adjacent to but outside of Harney County, including 346,965 acres of PPH and 825,395 acres of PGH. BLM-administered grazing allotments within Harney County are still eligible for inclusion under the Programmatic CCA. Because many grazers in Oregon use both private lands and BLM-administered allotments, the CCAA was structured after the Programmatic CCA in part to facilitate implementation of the agreements and encourage enrollment by such grazers (Jeff Everett, phone conversation with author, April 16, 2015). As of April 2015, 54 landowners have submitted letters of intent to enroll in the CCAA and have SSPs developed for their lands, which total approximately 320,000 acres of GRSG habitat (Jeff Everett, Email to author, April 16, 2015).

Oregon Multi-County Soil and Water Conservation District Programmatic CCAA. Following development of the Harney County Programmatic CCAA, USFWS and the Soil and Water Conservation Districts from Baker, Crook, Deschutes, Grant, Lake, Malheur, and southern Union Counties developed a programmatic CCAA for over 2.3 million acres of private rangelands within these counties, which represents the range of GRSG in Oregon. Again, BLM-administered grazing allotments within the counties are still eligible for inclusion under the Programmatic CCA, and again, the CCAA was structured after the Harney County CCAA in part to facilitate implementation of the agreements and encourage enrollment by grazers who use both private and BLM-administered allotments. As of April 2015, 55 landowners have submitted letters of intent to enroll in the CCAA and have SSPs developed for their lands, which total approximately 466,050 acres of GRSG habitat (Jeff Everett, Email to author, April 16, 2015).

The Oregon Department of State Lands (DSL) CCAA. DSL is working with the USFWS to develop a CCAA for State Common School Fund Rangelands in Oregon. These lands represent the final "gaps" in land ownership throughout GRSG range in Oregon not already covered by the CCA/CCAAs described above. The CCAA covers over 633,000 acres of DSL lands, including approximately 380,700 acres of low-density habitat and 153,100 acres of core area habitat (80 FR 9475). The required Environmental Assessment under NEPA is currently available for public comment and will be finalized in May 2015 (Jeff Everett, phone conversation with author, April 16, 2015).

Pacific Northwest Regional Infrastructure Team. In May 2013, Oregon Governor John Kitzhaber signed a Declaration of Cooperation with Secretary of the Interior Sally Jewell on the Pacific Northwest Regional Infrastructure Team. The Governor's offices of Washington and Idaho are also partners. This agreement recognized the need to, among other objectives, ensure

environmental and natural resource stewardship, including mitigating and protecting GRSG, while advancing infrastructure projects, further energy independence, and manage climate change risk.

Nevada/California Statewide Efforts

Nevada and California statewide efforts are described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ V.

Wyoming Statewide Efforts

Though several statewide efforts to conserve GRSG exist in Wyoming, including the Wyoming Executive Order and the Wyoming Sage-Grouse Working Group, these efforts will not be discussed further in this CEA due to the very small amount of GRSG habitat in Wyoming that falls within MZ IV, and the correspondingly small or negligible effect Wyoming statewide efforts would play in GRSG conservation in MZs IV and V, respectively.

Natural Resources Conservation Service Sage Grouse Initiative

The Natural Resources Conservation Service's (NRCS) Sage Grouse Initiative (SGI) is described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ III. SGI efforts in MZ IV are described here.

As of 2015, SGI has secured conservation easements on 98,167 acres within MZ IV (NRCS 2015). On these and additional private lands, SGI has completed other GRSG conservation actions within MZ IV, including implementation of grazing systems, conifer removal, vegetation seeding, and fence marking. These conservation actions are targeted at the critical threats in each MZ, consistent with those outlined in the COT report. SGI clusters implementation to achieve landscape benefits.

Other Regional Efforts

A programmatic EIS by the Western Area Power Administration (WAPA) and the USFWS for the entire upper Great Plains (including portions of MZ IV) will focus future wind energy developments in specific corridors outside of GRSG core habitat (Western Area Power Administration 2013). In accordance with Section 7 of the ESA, preparation of the programmatic EIS has involved consultation between cooperating entities and the USFWS and preparation of a programmatic Biological Assessment to ensure that the action will not jeopardize the continued existence of any federally listed species, including the federal candidate GRSG. At the time of this LUPA, specific conservation measures for protecting GRSG and its habitat under the programmatic EIS are not developed.

Tribes, counties, and local working groups are playing a critical role in promoting GRSG conservation at the local level. Individual conservation plans have been prepared by most local working groups to develop and implement strategies to improve or maintain GRSG habitat and reduce or mitigate threats

on the local level. The proposed conservation actions and recommendations in these plans are voluntary actions for private landowners.

The Elko County, Nevada GRSG Management and Conservation Strategy Plan (County of Elko 2012) is described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ III, and would also apply to MZ IV.

Local working group projects have included monitoring, research, and mapping habitat areas, as well as public outreach efforts such as landowner education and collaboration with federal, state, and other local entities.

Some local working group conservation plans recommend restricting resource uses as well (USGS 2014). For example, the Big Desert Sage-Grouse Conservation Plan (Big Desert Sage-grouse Local Working Group 2010) limits recreational OHV use to existing designated roads and trails. Local working group GRSG conservation plans in MZ IV include the following:

- North Magic Valley Conservation Plan (2011)
- West Central Conservation Plan (2010)
- East Idaho Uplands Conservation Plan (2011)
- Big Desert Conservation Plan (2010)
- Shoshone Basin Conservation Plan (2008)
- Jarbidge Conservation Plan (2007)
- Curlew Valley Conservation Plan (2004)
- Owyhee County Conservation Plan (2013)
- Upper Snake Conservation Plan (2009)
- Challis Conservation Plan (2010)
- Vale Conservation Plan (2005)
- Baker Conservation Plan (2005)
- Burns Conservation Plan (2005)
- Dillon Conservation Plan (2011)
- West Box Elder Conservation Plan (2006)
- Cache/East Box Elder (2006)
- North Central Nevada Conservation Plan (2004)
- Northeastern Nevada Conservation Plan (2004)

5.1.9 Relevant Cumulative Actions

This cumulative effects analysis considers the incremental impact of the Nevada and Northeastern California LUPA and alternatives in combination with other

past, present, and reasonably foreseeable future federal and non-federal actions on lands in MZ IV (see **Table 5-38**). Where these actions occur within GRSG habitat, they would cumulatively add to the impacts of BLM- and Forest Service-authorized activities set forth in the Nevada and Northeastern California LUPA. In addition to the conservation efforts described above, relevant reasonably foreseeable future cumulative actions occurring on federal, state, private, or mixed land ownership in MZ IV are described in the Proposed RMPAs/LUPAs for Idaho and Southwestern Montana, Oregon, Nevada and Northeastern California, and Utah, which are incorporated by reference.

The following list includes past, present, and reasonably foreseeable future actions in MZ IV that, when added to the Proposed Plan and alternatives for the Nevada and Northeastern California Sub-region, could cumulatively affect GRSG:

- Gateway West 230/500 Transmission Line Project, Wyoming and Idaho
- Boardman to Hemingway Transmission Line Project, Oregon and Idaho
- Fuels and vegetation treatments throughout the MZ
- Grazing permit renewals and allotment management plan updates throughout the MZ
- China Mountain Wind Project, Nevada and Idaho
- Small mining projects throughout the MZ

5.1.10 Threats to GRSG in Management Zone IV

In its COT report, the USFWS identifies fire, spread of weeds, conifer encroachment, infrastructure, grazing/free-roaming equids, conversion to agriculture, energy development, and recreation as the present and widespread threats facing GRSG in MZ IV (USFWS 2013a, pp. 22-24). Each threat is discussed below.

For those threats below that are analyzed quantitatively (infrastructure, livestock grazing, conversion to agriculture, energy development and mining, and recreation), acres presented in the analyses tables represent acres of land allocations from each of the Nevada and Northeastern California Sub-region LUPA/EIS alternatives in the Nevada and Northeastern California Sub-region portion of MZ IV, combined with acres of land allocations from the Proposed Plans of additional BLM and Forest Service sub-regions/planning areas in the non-Nevada and Northeastern California Sub-region portion of MZ IV.

Wildfire

Nature and Type of Effects. The impacts of wildfire on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Wildfire is a primary threat to GRSG habitats and populations across MZ IV, with 81 percent of priority habitat and general habitat being at high risk for wildfire, including the Snake-Salmon-Beaverhead and Northern Great Basin population areas (Manier et al. 2013, p. 133). Since 2000, more than 4.9 million acres (14 percent of priority habitat and 17 percent of general habitat) of GRSG habitat have burned in this MZ, with an average of more than 239,000 acres of priority habitat burned annually; more than 1 million acres burned in some years (Manier et al. 2013, p. 133). The Murphy Fire in Idaho and Nevada affected over 650,000 acres of habitat in this MZ in 2007 (USFWS 2013a, p. 78). In 2012, the Miller Homestead and Long Draw fires in southeastern Oregon burned 160,800 and 558,200 acres, respectively, mostly on BLM-administered lands with significant losses of GRSG habitat (BLM 2013i).

Impact Analysis. Management actions in the Nevada and Northeastern California Sub-region that emphasize wildfire suppression, pre-suppression, and fuels reduction in GRSG habitat would benefit the species by limiting habitat loss in the event of wildfire. As discussed in *Wildfire* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of wildfire, and would be in accordance with the COT objective for this threat. As discussed above, BLM actions in the sub-region could be expected to measurably affect GRSG habitat in MZ IV due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ. Forest Service actions would likely have a smaller influence on the MZ scale.

Recognition of the importance of sagebrush habitat during interagency wildfire response would benefit GRSG in the event of wildfires. The State of Nevada and State of Utah GRSG conservation plans discussed in **Section 5.1.6** would benefit GRSG habitat in the MZ. The Montana executive order emphasizes fire suppression in core population areas, while recognizing other suppression priorities may take precedence. These programs would benefit GRSG during wildfire planning and response throughout MZ IV, particularly on lands not administered by the BLM or Forest Service.

On the local level, the Owyhee County Sage-Grouse Conservation Plan (2013) recommends reseeding burned areas with sagebrush and implementing sagebrush restoration projects in historical GRSG habitat where historical fires have removed sagebrush cover. However, the conservation plan does not identify a funding source for this action.

The Interagency Standards for Fire and Fire Aviation Operations “Red Book” includes BMPs for GRSG habitat conservation for wildlife and fuels management (BLM 2013n). This document is a supplemental policy or guidance for the BLM, the Forest Service, and the USFWS. These BMPs could benefit GRSG and its habitat during interagency wildland fire operations by using spatial habitat data

and predictive services to prioritize and preposition firefighting resources in critical habitat areas. However, since several years have elapsed since GRSG BMPs were incorporated, benefits would likely now be apparent, and it is unclear if this is currently the case. In January 2015, Secretarial Order 3336 “Rangeland Fire Prevention, Management and Restoration” was signed by the Secretary of the Interior. The order sets forth enhanced policies and strategies for preventing and suppressing rangeland wildfire and for restoring sagebrush landscapes impacted by wildfire across the West for the DOI. The order will improve coordination with local, state, tribal, and regional efforts to address rangeland wildfire at a landscape level.

Coordination with rural fire districts to manage wildfires in GRSG habitat will further reduce this threat across land ownership types and improve the quality and quantity of habitat.

Reasonably foreseeable wildland fire management efforts are projected to increase (**Section 5.1.16**), especially through increased coordination of federal, state, and local fire prevention actions and the implementation of other BLM and Forest Service RMPAs/LUPAs in MZ IV. When the impacts of the Nevada and Northeastern California Sub-region LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

However, in those years where wildfires that threaten wildland-urban interface are widespread, firefighting resources would be shifted to those areas and away from GRSG habitat. Years with extensive involvement of wildland-urban interface in wildfires may not see the expected benefits of policies and direction intended to increase wildfire response in GRSG habitat.

Spread of Invasive Plants

Nature and Type of Effects. The impacts of invasive plants on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Via seeds carried by wind, humans, machinery, and animals, invasive plants have invaded and will continue to invade many locations in MZ IV, including the sub-region. Some species, including cheatgrass, have become so ubiquitous throughout the sub-region that it is considered economically infeasible to attempt to eradicate them. Modeling has suggested that more than 18 million acres of GRSG habitat in MZ IV are considered to be at a moderate to high risk for cheatgrass occurrence (Manier et al. 2013, p.90).

The BLM and Forest Service currently manage invasive plant infestations through integrated weed management: biological, chemical, mechanical, manual, and educational methods. The BLM is guided by the 1991 and 2007 RODs for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991a) and by the 2007 Programmatic Environmental Report (BLM 2007a). The BLM

also participates in the National Early Warning and Rapid Response System for Invasive Species. The goal of this system is to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes (FICMNEW 2003). Invasive plants are managed in cooperation with county governments and represent a landscape-level approach across management jurisdictions.

Impact Analysis. Increased surface disturbance, motorized transportation, and animal and human activity, would increase the chance for the establishment and spread of invasive plants. As discussed in *Spread of Invasive Plants* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of invasive plants, and would be in accordance with the COT objective for this threat. Other alternatives would also reduce the threat of invasive plant species relative to the No Action Alternative. As discussed above, BLM actions in the sub-region could be expected to measurably affect GRSG habitat in MZ IV due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ. Forest Service actions would likely have a smaller influence on the MZ scale.

Relevant cumulative actions that result in surface-disturbing activities would increase the potential for the spread of invasive plants on both federal and non-federal lands. Projects subject to the general stipulations outlined in the Montana executive order are required to control invasive plant species and to use native seed mixes during reclamation processes. Similarly, Utah's state plan directs land managers to aggressively respond to new infestations of invasive plants, and prioritize containment of infestations within sagebrush habitats. The Nevada state plan includes stipulations for including control of invasive plant species and use of native seed mixes during reclamation. The Nevada and Utah state plans also address invasive species in fire management. These stipulations would benefit GRSG habitat by limiting the spread or establishment of invasive species, particularly on lands that lack BLM and Forest Service protective regulatory mechanisms. Further, the *Greater Sage-Grouse Habitat Conservation Strategy for NRCS in Idaho* has identified GRSG conservation measures related to invasive plants, such as reducing the risk and rate of fire spread, restoration and rehabilitation, and invasive species control. A number of projects are ongoing or in the planning phase to treat invasive species in MZ IV (see **Table 5-38**).

Reasonably foreseeable invasive plant management efforts are projected to increase (**Section 5.1.16**), including other state and county noxious weed regulations and the implementation of other BLM and Forest Service RMPAs/LUPAs in MZ IV. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV. The Proposed Plan may result in the greatest net conservation gain due to its 3 percent

anthropogenic disturbance cap that should reduce potential for the spread of weeds during the 20-year analysis period.

Conifer Encroachment

Nature and Type of Effects. The impacts of conifer encroachment on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Approximately 2.6 million acres of GRSG habitat within MZ IV is at high risk for conifer encroachment. Of this total, approximately 55 percent of priority habitat at high risk for conifer encroachment (and 34 percent of general habitat) occur on BLM-administered lands within MZ IV (Manier et al. 2013, p. 93). In comparison, 25 percent of priority habitat at risk for conifer encroachment (and 32 percent of general habitat) occur on private lands, and 15 percent of priority habitat at high risk occurs on National Forest System lands (25 percent on general habitat). Therefore, BLM actions are likely to have a greater potential to ameliorate the effects of conifer encroachment on GRSG habitat, particularly in priority habitat, than any other single land management entity.

Impact Analysis. The COT objective is to remove pinyon and/or juniper from areas of sagebrush that are most likely to support GRSG (post-removal) at a rate that is at least equal to the rate of pinyon and/or juniper incursion (USFWS 2013a, p. 47). As discussed in *Conifer Encroachment* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of conifer encroachment. As discussed above, BLM actions in the sub-region could be expected to measurably affect GRSG habitat in MZ IV due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ. Forest Service actions would likely have a smaller influence on the MZ scale.

Relevant cumulative actions on federal, private, and state lands within the MZ include several large conifer removal projects (see **Table 5-38**). Further, the NRCS includes conservation measures to remove encroaching conifers near leks and other seasonal habitats while minimizing disturbance to GRSG (NRCS 2012, p. 13). SGI has helped reduce the threat of early succession conifer encroachment through mechanical removal on 206,099 acres of private lands within MZ IV. The majority of these efforts were located inside PACs (NRCS 2015), helping to preserve historic fire return intervals and important GRSG habitat. Utah's state plan directs land management agencies to remove encroaching conifers and conduct restoration of sagebrush habitats to expand GRSG habitat where possible.

Reasonably foreseeable conifer encroachment management efforts are projected to increase (**Section 5.1.16**), including efforts on private land and implementation of other BLM and Forest Service RMPAs/LUPAs in MZ IV. When the impacts of the Nevada and Northeastern California LUPA are added

to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV. The Proposed Plan would have the greatest reduction in the threat from conifer encroachment and provide a net conservation gain to GRSG. Alternatives D and E would also reduce the threat, though to a lesser degree than the Proposed Plan because they do not specify acres for treatment or habitat objectives.

Infrastructure

Rights-of-Way

Nature and Type of Effects. The impacts of ROWs on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Infrastructure, including ROWs and associated facilities and urbanization, is widespread throughout MZ IV and has affected GRSG habitat in many locations. Development of roads, fences, and utility corridors has also contributed to habitat loss and fragmentation in portions of MZ IV. The best available estimates suggest about 25 percent of the MZ IV is within approximately 4 miles of urban development (Knick et al. 2011, p. 214). Impacts of infrastructure development in MZ IV are primarily related to highways, roads, power lines, and communication towers, with 90 percent of MZ IV within 4 miles of a road, 30 percent within 4 miles of a power line, and 5 percent within 4 miles of a communication tower (Knick et al. 2011, pp. 215-216).

Although not representative of all infrastructure ROWs, transmission lines greater than 115 kilovolts indirectly influence 37 percent of priority habitat and 38 percent of general habitat across MZ IV. Indirect effects are assumed to occur to a radius of 4 miles (Manier et al. 2013, p. 41). Approximately 62 percent of transmission lines in priority habitat and 43 percent in general habitat are on BLM-administered lands across GRSG habitats in MZ IV (Manier et al. 2013, p. 41). In contrast, National Forest System lands contain 5 percent of transmission lines in priority habitat and 7 percent in general habitat. Therefore, BLM actions are likely to have a greater potential to affect transmission line ROWs in GRSG habitat than any other land management entity. Designating ROW exclusion and avoidance areas in PHMA and GHMA on BLM-administered and National Forest System lands could reduce the threat on these lands. However, in areas with scattered federal landownership, infrastructure may be routed around federal lands, often increasing its length and potential impact. ROW avoidance and exclusion areas on BLM-administered and National Forest System lands could increase this tendency.

Impact Analysis. As shown in **Table 5-14**, the largest impacts on GRSG would result from Alternatives B, C, and F, which would designate PHMA as ROW exclusion. Alternative F would also manage GHMA as ROW exclusion.

Table 5-14
Acres of Rights-of-Way Designations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Open to Rights-of-Way				
Alternative A	3,340,000	98%	2,958,000	44%
Alternative B	68,000	0%	1,653,000	0%
Alternative C	68,000	0%	1,653,000	0%
Alternative D	68,000	0%	1,653,000	0%
Alternative E	68,000	0%	1,653,000	0%
Alternative F	68,000	0%	1,653,000	0%
Proposed Plan	98,000	31%	1,671,000	1%
Right-of-Way Exclusion				
Alternative A	720,000	22%	533,000	10%
Alternative B	3,991,000	86%	533,000	10%
Alternative C	5,349,000	89%	481,000	0%
Alternative D	764,000	26%	489,000	2%
Alternative E	720,000	22%	533,000	20%
Alternative F	3,991,000	86%	1,838,000	74%
Proposed Plan	787,000	28%	493,000	2%
Right-of-Way Avoidance				
Alternative A	7,219,000	0%	5,726,000	0%
Alternative B	7,219,000	0%	7,031,000	19%
Alternative C	7,219,000	0%	5,726,000	0%
Alternative D	10,481,000	31%	7,039,000	19%
Alternative E	10,490,000	31%	7,031,000	19%
Alternative F	7,219,000	0%	5,726,000	0%
Proposed Plan	11,092,000	35%	6,642,000	14%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within rights-of-way designations in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

Alternatives D and the Proposed Plan would designate PHMA as ROW avoidance, and though Alternative E would not designate PHMA, measures in the Nevada state plan for ROW permitting would be similar to ROW avoidance in PHMA.

The acres in **Table 5-15** depict existing utility corridors in GRSG habitat in MZ IV. As shown in **Table 5-15**, the largest impact from management in the Nevada and Northeastern California Sub-region would be from Alternatives A, B, D, E, and F. Under Alternative C, the contribution of acres of existing utility corridors in PHMA in MZ IV would be reduced relative to Alternative A, but not as much as under the Proposed Plan.

Table 5-15
Acres of Existing Utility Corridors in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Alternative A	365,000	84%	195,000	56%
Alternative B	365,000	84%	195,000	56%
Alternative C	150,000	61%	0	0%
Alternative D	364,000	84%	196,000	56%
Alternative E	365,000	84%	195,000	56%
Alternative F	365,000	84%	195,000	56%
Proposed Plan	118,000	52%	123,000	31%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within existing utility corridors in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

New ROW authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in GRSG Core areas under both the Montana executive order and the Nevada and Utah state conservation plans for GRSG. These stipulations would benefit the GRSG in Core Habitat (Montana) and the SGMA (Nevada and Utah) in MZ IV by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from ROWs developments.

Presidential Priority transmission projects that are proposed in MZ IV (i.e., Boardman to Hemingway and Gateway West) would not be subject to GRSG conservation requirements in BLM and Forest Service GRSG LUPAs/RMPAs but would be subject to requirements in applicable state plans as well as other state and federal laws and regulations. They would also develop their own suite of protective measures analyzed in project-specific NEPA documents. These projects will be in compliance with BLM Instruction Memorandum 2012-043, Greater Sage-Grouse Interim Management Policies and Procedures, which

requires that GRSG habitat is maintained or enhanced through avoidance, minimization, and application of compensatory mitigation. Whether or not these project-specific measures would adequately protect GRSG is unknown at this point in time because the measures have not been finalized.

Because they would manage the most GRSG habitat as exclusion, Alternatives C and F would provide the greatest conservation gain to GRSG and its habitat in the Nevada and Northeastern California Sub-region and be most likely to meet the COT report objective, which is to avoid development of infrastructure in GRSG priority areas for conservation.

The effect of the alternatives and other conservation actions in the MZ (most notably the Nevada state plan and the Montana and Utah executive orders) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other seasonal habitats that do not follow geopolitical boundaries.

Reasonably foreseeable ROW development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future ROW developments would be further reduced. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ IV by providing the greatest amount of ROW exclusion in GRSG habitat. The Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site ROWs with the least impact on GRSG habitat.

Renewable Energy: Wind and Solar

Nature and Type of Effects. The impacts of renewable energy on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Wind energy development is an increasing threat to some populations in MZ IV. Over the last six years, the BLM has authorized and then relinquished one ROW for wind development and has two pending applications. Wind testing sites have been authorized on BLM-administered lands in the Idaho and Southwestern Montana Sub-region, though no commercial scale wind developments have been authorized and constructed (see **Chapter 5** of the Idaho and Southwestern Montana Sub-region LUPA/EIS).

Although not representative of all renewable energy development, wind turbines indirectly influence less than 1 percent of priority habitat and general

habitat combined across MZ IV. Private lands account for 82 percent of wind turbines affecting GRSG in priority habitat (and 62 percent in general habitat) within MZ IV. Therefore, conservation actions on private land are likely to have a greater potential to ameliorate the effects of wind energy development on GRSG habitat than any other single land management entity.

Solar energy potential is low in MZ IV, and the BLM has not received any applications for utility-scale solar production in the sub-region, nor are there solar resources comparable to the areas where utility-scale solar production projects are being proposed or built.

Impact Analysis. **Table 5-16** shows acres of wind energy management designations in GRSG habitat in MZ IV. As shown in the table, the Nevada and Northeastern California LUPA Alternatives C, D and F and the Proposed Plan would have the greatest contribution to acres of wind ROW exclusion in PHMA in MZ IV and would be the most protective of GRSG and its habitat in MZ IV. The No Action Alternative would leave the most GRSG habitat open to wind ROWs and would be least protective of GRSG and its habitat. Though Alternative E would not designate PHMA or GHMA, Core and Priority Habitats designated under this alternative would be equivalent to PHMA and GHMA, respectively, and additional stipulations and the Nevada state plan's avoid, minimize, mitigate strategy would apply to wind ROW developments and would provide additional protections over Alternative A. Under the Proposed Plan, PHMA would be managed as exclusion for commercial wind facilities. GHMA would be ROW avoidance for wind facilities. Wind developments would also be subject to the anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs (consistent with applicable law), buffers, and a mitigation requirement.

Table 5-16
Acres of Wind Energy Management Designations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
	Open to Wind Rights-of-Way			
Alternative A	3,272,000	100%	2,805,000	47%
Alternative B	0	0%	1,500,000	0%
Alternative C	0	0%	1,500,000	0%
Alternative D	0	0%	1,500,000	0%
Alternative E	0	0%	1,500,000	0%
Alternative F	0	0%	1,500,000	0%
Proposed Plan	0	0%	1,500,000	0%

Table 5-16
Acres of Wind Energy Management Designations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Wind Right-of-Way Exclusion				
Alternative A	6,619,000	2%	1,301,000	4%
Alternative B	9,890,000	35%	1,301,000	4%
Alternative C	11,248,000	43%	1,249,000	0%
Alternative D	9,926,000	35%	2,570,000	51%
Alternative E	6,619,000	2%	1,301,000	4%
Alternative F	9,890,000	35%	2,606,000	52%
Proposed Plan	10,587,000	39%	1,261,000	1%
Wind Right-of-Way Avoidance				
Alternative A	1,390,000	0%	5,112,000	0%
Alternative B	1,390,000	0%	6,145,000	17%
Alternative C	1,390,000	0%	5,112,000	0%
Alternative D	1,390,000	0%	5,112,000	0%
Alternative E	3,031,000	54%	6,145,000	17%
Alternative F	1,390,000	0%	5,112,000	0%
Proposed Plan	1,390,000	0%	6,046,000	15%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within wind energy management designations in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

Across MZ IV, most other sub-region LUPA Proposed Plans maintain exclusion areas in PHMA for wind energy, with the exception of Oregon, which allows for avoidance in PHMA in Lake, Harney, and Malheur Counties. The Proposed Plan in Idaho would allow wind energy development in GHMA, subject to a screening process, whereas Montana would manage GHMA as avoidance for wind. In the Nevada and Northeastern California Sub-region, wind and solar ROWs would be excluded in PHMA. GHMA would also be exclusion for wind ROW, while GHMA would be avoidance for solar ROWs.

Projects that require state agency review or approval would be subject to the Montana executive order permitting process. This would encourage wind energy development outside of core habitat areas. Similarly, in Nevada, wind energy developments would be located outside of core, priority, and general habitats, or would minimize and/or mitigate for impacts if avoidance is not

feasible. The Utah Executive Order directs state agencies to minimize disturbance within GRSG management areas and maintain consistency with conservation measures in the Utah state plan. In Oregon and Idaho, wind energy projects could voluntarily site development outside of GRSG habitat, but currently no regulatory mechanisms are in place to reduce impacts on GRSG habitat from projects requiring state agency review or approval.

The effect of the Proposed Plan and other conservation actions in the MZ (most notably the Nevada state plan and the Montana and Utah executive orders) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other seasonal habitats that do not follow geopolitical boundaries.

Reasonably foreseeable energy development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as wind energy restrictions in other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future energy developments would be further reduced. Alternatives C, D, and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ IV by providing the greatest amount of wind exclusion in GRSG habitat. The Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site energy developments with the least impact on GRSG habitat.

Livestock Grazing and Free Roaming Equids

Nature and Type of Effects. The impacts of livestock grazing and free-roaming equids on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Livestock grazing is prevalent across MZ IV. Rangeland health assessments have found that over 19 percent of BLM-administered grazing allotments in GRSG habitat in MZs IV are not meeting wildlife standards with grazing as a causal factor (Manier et al. 2013, p. 97).

Nearly 2 million acres of GRSG habitat within MZ IV is federally managed wild horse and burro range (Manier et al. 2013, p. 102); 5.7 percent of priority habitat in MZ IV is negatively influenced by free-roaming equids (Manier et al. 2013, p. 102).

Impact Analysis. **Table 5-17** shows acres available and unavailable to livestock grazing in GRSG habitat in MZ IV. As shown in the table, with the exception of Alternative C, the Nevada and Northeastern California LUPA action alternatives would have a similar contribution to acres available to livestock grazing. Alternative C would exclude livestock grazing from PHMA. The Proposed Plan would reduce slightly the acres available to grazing in MZ IV.

Table 5-17
Acres Available and Unavailable to Livestock Grazing in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Available to Livestock Grazing				
Alternative A	11,057,000	31%	9,053,000	14%
Alternative B	11,057,000	31%	9,053,000	14%
Alternative C	7,636,000	0%	7,757,000	0%
Alternative D	11,076,000	31%	9,034,000	14%
Alternative E	11,057,000	31%	9,053,000	14%
Alternative F	11,057,000	31%	9,053,000	14%
Proposed Plan	11,687,000	35%	8,679,000	11%
Unavailable to Livestock Grazing				
Alternative A	211,000	6%	149,000	16%
Alternative B	211,000	6%	149,000	16%
Alternative C	4,953,000	96%	124,000	0%
Alternative D	227,000	12%	133,000	6%
Alternative E	211,000	6%	149,000	16%
Alternative F	211,000	6%	149,000	16%
Proposed Plan	262,000	24%	124,000	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA available and unavailable to livestock grazing in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

As discussed in *Livestock Grazing and Free Roaming Equids* in **Section 5.1.6**, the alternative which most reduces acres available for grazing would not necessarily have the greatest benefit on GRSG populations and habitat. Given these considerations, and because the Proposed Plan contains additional measures that would improve GRSG habitat as discussed in **Section 5.1.6**, the Proposed Plan would provide the greatest benefit to GRSG of all the alternatives.

Relevant cumulative actions that improve grazing management with respect to GRSG within MZ IV include rangeland health improvements through the NRCS

SGI. These improvements are described in *Livestock Grazing and Free Roaming Equids* in **Section 5.1.6**. Within MZ IV, SGI has implemented 314,930 acres of prescribed grazing systems. This program is likely the largest and most impactful program on private lands within MZ IV. Because of its focus on priority areas for conservation, which often overlap PHMA, the SGI's past, present, and reasonably foreseeable work has had and likely will continue to have a cumulative beneficial impact on GRSG when considered alongside protective BLM and Forest Service management actions in PHMA.

Reasonably foreseeable livestock grazing management efforts in MZ IV are expected to increase over the analysis period (**Section 5.1.16**), through increased NRCS conservation actions under the Sage-Grouse Initiative (e.g., fence marking and conservation easements), state efforts to maintain ranchland, and the implementation of other BLM and Forest Service LUPAs in MZ IV. When grazing management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

Under all alternatives the BLM has the authority to adjust wild horse and burros AMLs if resource damage occurs; however, only Alternatives B through F and the Proposed Plan provide management guidelines specific to GRSG habitat, which would benefit the species more than Alternative A. Under most action alternatives, management actions and range improvements for wild horses and burros would follow management action for livestock range improvements and be aligned with GRSG habitat objectives, as described in **Section 5.1.6**.

Reasonably foreseeable wild horse management efforts are projected to increase over the analysis period (**Section 5.1.16**) with implementation of other BLM and Forest Service LUPAs in MZ IV. When wild horse management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV. Impacts may be reduced to the greatest extent under the Proposed Plan, where AMLs would be evaluated with consideration of GRSG habitat objectives for BLM-administered lands.

Conversion to Agriculture

Nature and Type of Effects. The impacts of agricultural conversion on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Regional assessments estimate that while only 1 percent of priority habitat and general habitat in MZ IV are directly influenced by agricultural development, over 85 percent of GRSG habitat is within approximately 4 miles of agricultural land and indirectly influenced by it (Manier et al. 2013, p. 27).

Impact Analysis. The BLM and Forest Service do not convert public lands to agriculture. As such, the only direct authority these agencies have over

conversion to agriculture is by retaining or disposing of lands in the realty program. Lands retained under BLM and Forest Service management will not be converted to agriculture, and disposing of lands could increase the likelihood they will be converted to agriculture, depending on their location and new management authority.

Table 5-18 shows acres identified for retention and disposal in GRSG habitat in MZ IV. As shown in the table, the Nevada and Northeastern California LUPA action alternatives acres of PHMA identified for retention would not vary substantially across alternatives and would have a similar contribution to acres identified for retention across MZ IV. Alternative C would retain approximately twice the PHMA as the other alternatives in the sub-region, which would translate to additional retained acres of PHMA across MZ IV. Since Alternatives B, C, D, and F would retain all PHMA in public ownership, acres of PHMA identified for disposal under these alternatives would be zero. Under the Proposed Plan, PHMA would be retained unless there is a net conservation gain to GRSG by disposal of PHMA.

Table 5-18
Acres Identified for Retention and Disposal in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Acres Identified for Retention				
Alternative A	11,129,000	29%	9,034,000	13%
Alternative B	11,279,000	30%	9,034,000	13%
Alternative C	12,637,000	38%	7,859,000	0%
Alternative D	11,315,000	31%	9,181,000	14%
Alternative E	11,129,000	29%	9,034,000	13%
Alternative F	11,279,000	30%	9,034,000	13%
Proposed Plan	11,973,000	34%	8,627,000	9%
Acres Identified for Disposal				
Alternative A	151,000	100%	362,000	51%
Alternative B	4,000	0%	359,000	51%
Alternative C	4,000	0%	178,000	0%
Alternative D	4,000	0%	178,000	0%
Alternative E	151,000	100%	359,000	51%
Alternative F	4,000	0%	359,000	51%
Proposed Plan	4,000	0%	178,000	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA identified for retention and disposal in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

Cumulative impacts vary relatively little across alternatives because BLM and Forest Service management have little impact on alleviating this threat. Restrictions on grazing on federal land could increase agriculture pressure on adjacent private lands. If the loss of federal grazing rights makes ranching economically unviable, the potential conversion of private grazing lands to agriculture could increase. However, the Proposed Plan does not substantially increase acreage unavailable to grazing.

The COT report objectives for converting land to agriculture are to avoid further loss of sagebrush habitat for agricultural activities (both plant and animal production) and to prioritize restoration. In areas where taking agricultural lands out of production has benefited GRSG, the programs supporting these actions should be targeted and continued (USFWS 2013a, p. 48). In accordance with this objective, the NRCS's SGI program focuses on maintaining ranchland that provides habitat for GRSG, as described under *Conversion to Agriculture* in **Section 5.1.6**. As of 2014, SGI has secured conservation easements on 98,167 acres within MZ IV and marked or removed 95 miles of fence (NRCS 2015).

As discussed in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of agricultural conversion. Over the analysis period, conversion to agriculture is expected to increase (**Section 5.1.16**), though state and private conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat. When land tenure decisions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in net conservation gain to GRSG habitats and populations in MZ IV.

Energy Development and Mining

The COT report states that energy development should be designed to ensure that it will not impinge on stable or increasing GRSG population trends. For mining, the COT report objective is to maintain stable to increasing GRSG populations and no net loss of GRSG habitats in areas affected by mining (USFWS 2013a, p. 49).

There are approximately 1,137,700 acres of GRSG habitat in MZ IV where energy and mineral development (including geothermal, mineral materials, locatable and nonenergy leasable minerals) is presently occurring. There are 6,553,300 acres indirectly influenced by energy development (including oil and gas, and mineral materials; indirect effects were not quantified for geothermal and nonenergy leasable mineral developments) (Manier et al. 2013, pp. 52-71). No coal or oil and gas development is presently occurring in MZ IV. Wind energy development is discussed in *Renewable Energy*, above.

Oil and Gas

Nature and Type of Effects. The impacts of oil and gas development on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Currently, oil and gas development within MZ IV is limited to the extent that the area of direct impact on priority habitat and general habitat is smaller than the minimum reporting size of Manier et al. (2013, p. 52). However, because indirect influence was estimated to extend nearly 12 miles from oil and gas development, approximately 222,100 acres of priority habitat and 32,700 acres of general habitat are influenced by oil and gas development in MZ IV (Manier et al. 2013, p. 52). The area of indirect influence is split evenly between BLM-administered and private lands. Additionally, approximately 346,000 acres (1 percent) of GRSG habitat in MZ IV are leased but currently undeveloped (Manier et al. 2013, p. 55), representing additional potential impacts on GRSG and its habitat.

Although oil and gas activities have a disproportionately greater effect on private lands due to lack of BLM or Forest Service regulatory oversight, regulatory mechanisms on both federal surface and split-estate lands in MZ IV would be influential should fluid mineral development occur. Development on split-estate lands with BLM-administered federal mineral estate and other surface ownership would require mitigation for impacts on GRSG habitat on private surface lands that would not be required on lands with both privately held surface and mineral estates.

According to the RFD scenario (**Appendix P**), permanent disturbance associated with oil and gas development is projected to occur on 1,246 acres within the sub-region over the next 20 years (though only 128 acres of permanent disturbance will remain after reclamation is applied to temporarily disturbed areas), representing less than 1 percent of GRSG habitat within either the sub-region or MZ IV. The potential for impacts would be reduced where areas are closed to fluid mineral leasing and where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law (**Appendix D**), the likelihood for impacts on GRSG habitat on BLM-administered and National Forest System lands is anticipated to be small and localized under all alternatives.

Impact Analysis. **Tables 5-19** and **5-20** provide a quantitative summary of fluid mineral leasing conditions on BLM-administered and National Forest System lands across MZ IV.

As shown in **Tables 5-19** and **5-20**, fluid mineral closures and stipulations within the Nevada and Northeastern California Sub-region alternatives would contribute some level of influence within the wider MZ IV. For example, Alternatives C and F would contribute most of the acres closed to fluid mineral

Table 5-19
Acres Open and Closed to Fluid Mineral Leasing in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Open* to Fluid Mineral Leasing				
Alternative A	3,272,000	100%	1,306,000	100%
Alternative B	0	0%	1,306,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%
Closed to Fluid Mineral Leasing				
Alternative A	1,439,000	11%	1,347,000	4%
Alternative B	4,710,000	73%	1,347,000	4%
Alternative C	6,067,000	79%	1,295,000	0%
Alternative D	1,483,000	13%	1,303,000	1%
Alternative E	1,439,000	11%	1,347,000	4%
Alternative F	4,710,000	73%	2,652,000	51%
Proposed Plan	1,507,000	15%	1,308,000	1%

Source: BLM 2015

*Open with standard stipulations. This table displays the acres of PHMA and GHMA open and closed to fluid mineral leasing in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

Table 5-20
Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
NSO Stipulations				
Alternative A	7,454,000	0%	3,828,000	0%
Alternative B	7,454,000	0%	3,828,000	0%
Alternative C	7,454,000	0%	3,828,000	0%
Alternative D	10,716,000	30%	5,142,000	26%
Alternative E	7,454,000	0%	3,828,000	0%
Alternative F	7,454,000	0%	3,828,000	0%
Proposed Plan	11,354,000	34%	3,828,000	0%

Table 5-20
Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
	CSU/TL Stipulations			
Alternative A	0	0%	4,104,000	0%
Alternative B	0	0%	4,104,000	0%
Alternative C	0	0%	4,104,000	0%
Alternative D	0	0%	4,104,000	0%
Alternative E	3,271,000	100%	5,409,000	24%
Alternative F	0	0%	4,104,000	0%
Proposed Plan	0	0%	5,037,000	19%

Source: BLM 2015

This table displays the acres of PHMA and GHMA with NSO Stipulations and CSU/TL Stipulations in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

leasing within MZ IV in GRSG habitat, and these alternatives would be most protective of GRSG and its habitat. As such, reasonably foreseeable future leasing projects would be less likely to impact GRSG populations on federal lands. Alternative D and the Proposed Plan would impose major stipulations on PHMA and GHMA, contributing 44 and 26 percent of PHMA and GHMA in MZ IV with these stipulations, respectively. The Proposed Plan would provide additional protections to GRSG from fluid mineral development by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, buffers, mitigation requirements, RDFs consistent with applicable law, and by managing SFAs as NSO with no waivers, exceptions, and modifications. Alternative E would contribute all of the PHMA with minor constraints in MZ IV.

All BLM and Forest Service Proposed Plans within MZ IV include RDFs (consistent with applicable law) to minimize impacts on GRSG from oil and gas development on federal lands. In areas where mineral estate is currently unleased, these tools can be applied to future leases; in areas which are already leased, RDFs consistent with applicable law can be applied as conditions of approval for development of existing leases. Similarly, state plans contain similar measures to reduce impacts. Together, these measures would help protect unfragmented habitats, minimize habitat loss and fragmentation, and maintain conditions that meet GRSG life history needs. Recent research indicates that restored habitats lack many of the features sought by GRSG in their habitat areas and may not support GRSG for long periods following restoration activities. In order to conserve GRSG populations on the landscape, protection of existing habitat through minimizing development would provide the best hope for GRSG persistence (Arkle et al. 2014).

Reasonably foreseeable oil and gas development is limited in the MZ. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, the impact would be a net conservation gain due in large part to implementation of NSO stipulations, anthropogenic disturbance caps, and adaptive management that would minimize future disturbances to GRSG populations and habitats.

Under the Montana Executive Order, authorizations of oil and gas development that require state agency review or approval would be subject to the GRSG permitting process. They also would be subject to stipulations for development in GRSG Core areas. Similarly, authorizations in Nevada would be subject to measures in the Nevada state plan, including avoidance, minimization, and mitigation of any unavoidable impacts on GRSG habitat. Oil and gas lease authorizations in Utah that require state agency review or approval would be subject to the Utah executive order, which directs the Utah division of Oil, Gas, and Mining to consult with UDWR on all actions within GRSG management areas, and incorporate conservation measures from the state's GRSG conservation plan.

The effect of the Nevada and Northeastern California LUPA alternatives and other past, present, and reasonably foreseeable future conservation actions in the MZ (most notably the Nevada state plan and Montana and Utah executive orders) could be synergistic, meaning that the effects of the actions together is greater than the sum of their individual effects. For example, applying buffers in PHMA and on state and private land would effectively conserve larger blocks of land than if these actions occurred individually. This would provide a landscape-scale net conservation benefit, especially in areas where little development has occurred to date.

Reasonably foreseeable oil and gas development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ IV by providing the greatest amount of GRSG habitat closed to leasing. The Proposed Plan would also reduce the threat to a lesser degree through designation of NSO stipulations and additional conservation measures.

Geothermal

Nature and Type of Effects. The impacts of geothermal development on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and MZ IV. Geothermal energy development potential is particularly high throughout MZ IV, though geothermal leases directly affect 75,900 acres (less than 1 percent) of GRSG habitats in the MZ (Manier et al. 2013, p. 71). Geothermal leases in the sub-region cover 60,000 acres (**Section 3.12**).

The RFD scenario for the Nevada and Northeastern California Sub-region (**Appendix P**) predicts up to 12 new geothermal power plants and estimates between 53 and 367 acres of disturbance would be required for each plant. Therefore, between 636 and 4,404 acres of temporary and permanent disturbance associated with geothermal development over the next 20 years is expected under the No Action Alternative throughout the sub-region on both BLM-administered and National Forest System lands. The conservative assumption that all 4,404 acres of disturbance would be located within MZ IV, on PHMA, would mean that less than 1 percent of PHMA within MZ IV would be directly affected under this scenario. It is reasonable to assume that not all 4,404 acres of disturbance would occur within GRSG habitat; however, indirect impacts from such development would affect a considerably larger area than the direct footprint of development, as discussed for several threats above. Typical geothermal development includes roads, transmission lines, and associated linear features in addition to power plant development, and as discussed above these features may contribute to spread of invasive plants, habitat fragmentation, and increased predation on GRSG. Some of this acreage would be reclaimed after operations are ceased or wells abandoned.

Impact Analysis. Under the RFD scenario for the action alternatives, estimated disturbance would generally decrease between 0 and 70 percent, relative to the No Action Alternative. The potential for impacts would be reduced where areas are closed to fluid mineral leasing and where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law (**Appendix D**), the likelihood for impacts on GRSG habitat is anticipated to be small and localized under all alternatives, including the No Action Alternative.

The quantitative analysis of effects from geothermal leasing would be the same as described for oil and gas because allocations and past, present, and reasonably foreseeable future actions would be the same.

Coal

Coal potential is low throughout MZ IV (Manier et al. 2013, p. 133) and there are no direct or indirect effects from surface coal leases in the MZ (Manier et al. 2013, p. 74). There are no leasable coal deposits or coal development in the Nevada and Northeastern California Sub-region (**Section 3.13**). This threat will not be described further for this MZ in this document.

Mineral Materials

Nature and Type of Effects. The impacts of mineral materials on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. There are 652,000 acres of mining and mineral materials disposal sites (not including minerals mined as energy sources) on BLM-administered surface land on priority habitat and general habitat in MZ IV. There are 1,049,600 acres across all landownership types, making BLM-administered land the largest contributor (62 percent) to direct effects from this threat. National Forest System lands contribute to direct effects on 170,200 acres (16 percent) of priority habitat and general habitat. Indirect effects are estimated to 1.5 miles out from the direct effects area (Manier et al. 2013, p. 77). The mineral materials currently being developed for commercial purposes in the MZ IV include stone, sand and gravel, limestone, soil, and pumice.

Across MZ IV, priority habitat and general habitat are most affected by mining and mineral materials disposal sites on BLM-administered lands. GRSG may be directly impacted, being in the path of development; however, indirect impacts on habitat affect a much wider population of birds. In total, 61 percent of priority habitat and 48 percent of general habitat influenced by the indirect impact of mining and mineral materials disposal sites are on BLM-administered land. This does not include minerals mined as energy sources. Mining and mineral materials disposal sites on private land, by comparison, indirectly affect 26 percent of priority habitat and 34 percent of general habitat. National Forest System lands indirectly affect 10 percent of priority habitat and 13 percent of general habitat (Manier et al. 2013, p. 77). As a result, management of mining and material disposal sites on BLM-administered land would have the greatest impact on GRSG habitat conditions should mineral development occur.

Impact Analysis. **Table 5-21** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open and closed to mineral material disposal across MZ IV. As shown in the table, both Alternatives A and E would contribute all of the PHMA open to mineral material disposal in MZ IV; Alternative E would not close PHMA as in the other alternatives but instead mineral materials developments in PHMA would be subject to the Nevada state plan's avoid, minimize, and mitigate permitting strategy. Under Alternative A, most public lands within the sub-region are open to mineral material disposal. Specific closures of areas to mineral materials such as ACECs or crucial or essential wildlife habitat exist throughout the sub-region; however, this alternative provides the least protection to GRSG populations or habitat. Under Alternatives B, C, D, and F and the Proposed Plan, PHMA would generally be managed as closed to mineral material disposal. Under Alternative D, GHMA would also be closed to mineral material disposal; Alternative D may provide the greatest protection to GRSG and its habitat by closing PHMA and GHMA to mineral materials disposal.

Table 5-21
Acres Open and Closed to Mineral Material Disposal in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Open to Mineral Material Disposal				
Alternative A	3,277,000	>99%	8,981,000	15%
Alternative B	5,000	0%	8,981,000	15%
Alternative C	5,000	0%	7,676,000	0%
Alternative D	5,000	0%	7,676,000	0%
Alternative E	3,277,000	>99%	8,981,000	15%
Alternative F	5,000	0%	8,981,000	15%
Proposed Plan	5,000	0%	8,609,000	11%
Closed to Mineral Material Disposal				
Alternative A	8,882,000	2%	1,569,000	3%
Alternative B	12,153,000	28%	1,569,000	3%
Alternative C	13,510,000	35%	1,517,000	0%
Alternative D	12,189,000	28%	2,839,000	47%
Alternative E	8,882,000	2%	1,569,000	3%
Alternative F	12,153,000	28%	1,569,000	3%
Proposed Plan	12,850,000	32%	1,529,000	1%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open and closed to mineral material disposal in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

The Proposed Plan would close PHMA to new mineral materials sales, though PHMA would remain open to expansion of existing pits. The Proposed Plan would provide additional protections to GRSG from mineral material development by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs consistent with applicable law, buffers, and mitigation. These closures and restrictions would reduce the effect on GRSG from mineral material development on BLM-administered and National Forest System lands in MZ IV compared to most action alternatives. However, these actions may shift development onto non-federal lands, with potentially greater impact on GRSG. This is because similar protective stipulations and permit requirements might not apply on those other lands.

Under the Montana Executive Order, authorizations of new mineral material disposal sites that require state agency review or approval would be subject to

the GRSG permitting process. They also would be subject to stipulations for development in GRSG Core areas. Similarly, authorizations in Nevada would be subject to measures in the Nevada state plan, including avoidance, minimization, and mitigation of any unavoidable impacts on GRSG habitat, and authorization in GRSG management areas in Utah would be subject to consultation with UDWR and conservation measures. New authorizations that would occur in the majority of MZ IV within Idaho or Oregon that lack state plans containing regulatory mechanisms may incorporate GRSG habitat recommendations from these states' plans, though these would be voluntary measures and not binding conditions. These stipulations would be of particular benefit on privately owned surface and on split-estate lands with BLM-administered federal mineral estate and other surface ownership, where BLM and Forest Service protective regulatory mechanisms do not apply.

Reasonably foreseeable mineral materials development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

Locatable Minerals

Nature and Type of Effects. The impacts of locatable minerals management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. The primary locatable minerals in commercially viable quantities in MZ IV include zeolite, bentonite, diatomaceous earth, limestone, perlite, sunstone, bentonite, gold, silver, and copper.

Impact Analysis. **Table 5-22** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open to and recommended for withdrawal from mineral entry across MZ IV. As shown in the table, Alternatives A, D, and E would contribute nearly half of the PHMA open to locatable entry in MZ IV. Alternatives B, C, and F would recommend PHMA for withdrawal. While some acres of PHMA would still be available for locatable mineral entry under the Proposed Plan, SFAs would be recommended for withdrawal and additional protections under this alternative would provide the greatest benefit to GRSG populations and habitat compared to the other action alternatives as discussed in **Section 5.1.6**. However, implementation of this alternative could push development onto private lands with less restrictions, thereby increasing impacts on GRSG.

Table 5-22
Acres Open and Recommended for Withdrawal from Locatable Mineral Entry
in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Open to Locatable Mineral Entry				
Alternative A	7,772,000	44%	10,345,000	13%
Alternative B	4,367,000	0%	10,345,000	13%
Alternative C	4,367,000	0%	9,023,000	0%
Alternative D	7,780,000	44%	10,337,000	13%
Alternative E	7,772,000	44%	10,345,000	13%
Alternative F	4,367,000	0%	10,345,000	13%
Proposed Plan	6,108,000	29%	9,960,000	9%
Recommended for Withdrawal from Locatable Mineral Entry				
Alternative A	3,664,000	0%	9,000	0%
Alternative B	7,069,000	48%	9,000	0%
Alternative C	8,391,000	56%	9,000	0%
Alternative D	3,664,000	0%	9,000	0%
Alternative E	3,664,000	0%	9,000	0%
Alternative F	7,069,000	48%	9,000	0%
Proposed Plan	5,974,000	39%	9,000	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open to mineral entry and recommended for withdrawal from locatable mineral entry in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

Authorizations of new locatable mineral sites that require state agency review or approval would be subject to either the regulatory mechanisms of the Montana, Nevada, or Utah state plans. These measures would be of particular benefit on privately owned surface and on split-estate lands with BLM-administered federal mineral estate and other surface ownership, where BLM and Forest Service protective regulatory mechanisms do not apply.

Reasonably foreseeable locatable mineral development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by applying RDFs as Conditions of Approval. The disturbance caps in the Proposed Plans would not block locatable mineral entry projects, but any locatable mineral entry would be considered as disturbance under the cap. When restrictions within the Nevada

and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

Nonenergy Leasable Minerals

Nature and Type of Effects. The impacts of nonenergy leasable minerals management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Existing leases for nonenergy leasable minerals represent a relatively small threat spatially, as 12,000 acres (less than 1 percent) of GRSG habitats in MZ IV are directly affected by existing prospecting permits (Manier et al. 2013, p. 71). Phosphate development is prevalent in southeastern Idaho, though acres disturbed are not known.

Impact Analysis. **Table 5-23** provides a quantitative summary of acreages of BLM-administered and National Forest System lands open and closed to nonenergy mineral leasing across MZ IV. As shown in the table, both Alternatives A and E would contribute all of the PHMA open to nonenergy mineral leasing in MZ IV; Alternative E would not close PHMA as in the other alternatives but instead leasing in PHMA would be subject to the Nevada state plan avoid, minimize, and mitigate permitting strategy. Alternatives C and D would have the largest contribution of PHMA closed to nonenergy mineral leasing, followed by Alternatives B, D, F, and the Proposed Plan. Because they would close the greatest amount of GRSG habitat to nonenergy mineral leasing, Alternatives C and D would be the most protective of GRSG and its habitat.

Table 5-23
Acres Open and Closed to Nonenergy Leasable Mineral Leasing in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
	Open to Nonenergy Leasing			
Alternative A	3,272,000	100%	8,763,000	15%
Alternative B	0	0%	8,763,000	15%
Alternative C	0	0%	7,458,000	0%
Alternative D	0	0%	7,458,000	0%
Alternative E	3,272,000	100%	8,763,000	15%
Alternative F	0	0%	8,763,000	15%
Proposed Plan	0	0%	8,391,000	11%

Table 5-23
Acres Open and Closed to Nonenergy Leasable Mineral Leasing in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
	Closed to Nonenergy Leasing			
Alternative A	8,887,000	2%	1,787,000	3%
Alternative B	12,158,000	28%	1,787,111	3%
Alternative C	13,515,000	35%	1,735,000	0%
Alternative D	12,193,000	28%	3,056,000	43%
Alternative E	8,887,000	2%	1,787,000	3%
Alternative F	12,158,000	28%	1,787,000	3%
Proposed Plan	12,855,000	32%	1,747,000	1%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open and closed to nonenergy leasing in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

The Proposed Plan would close PHMA to new nonenergy mineral leases, though PHMA would remain open to expansion of existing pits. The Proposed Plan would provide additional protections to GRSG from nonenergy mineral leasing by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs consistent with applicable law, buffers, and mitigation. These closures and restrictions would reduce the effect on GRSG from leasing on BLM-administered and National Forest System lands in MZ IV compared to most action alternatives. However, these actions may shift development onto non-federal lands, with potentially greater impacts on GRSG. This is because similar protective stipulations and permit requirements might not apply on those other lands.

However, under the Montana Executive Order, authorizations of new nonenergy mineral leases that require state agency review or approval would be subject to the GRSG permitting process. They also would be subject to stipulations for development in GRSG Core areas. Similarly, authorizations in Nevada would be subject to measures in the Nevada state plan, including avoidance, minimization, and mitigation of any unavoidable impacts on GRSG habitat, and authorization in GRSG Management Areas in Utah would subject to consultation with UDWR and conservation measures. New authorizations that would occur in the majority of MZ IV within Idaho or Oregon that lack state plans containing regulatory mechanisms may incorporate GRSG habitat recommendations from these states' plans though these would voluntary measures and not binding conditions. These stipulations would be of particular benefit on privately-owned surface and on split-estate lands with BLM-

administered federal mineral estate and other surface ownership, where BLM and Forest Service protective regulatory mechanisms do not apply.

Reasonably foreseeable nonenergy leasable mineral development in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**). However, state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by providing additional protections such as disturbance caps, RDFs, and mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

Recreation

Nature and Type of Effects. The impacts from recreation management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ IV. Human populations have increased and expanded, primarily over the past century and in the western portion of the sagebrush distribution (Knick et al. 2011, p. 212). With these expanding populations come greater human impacts (Leu et al. 2008), including from recreational uses of BLM-administered and National Forest System lands. Uninhabited areas within the Great Basin ecoregion (portions of MZs III, IV, and V) decreased 90 percent (from 22.2 million acres to less than 3 million acres) with expansion driven in part by economic and recreation opportunities in the region (Torregrosa and Devoe 2008, p. 10).

The COT report objectives for recreation are to maintain healthy native sagebrush communities, based on local ecological conditions, and to manage direct and indirect human disturbance (including noise) to avoid interruption of normal GRSG behavior (USFWS 2013a, p. 49). Limits on road use under the action alternatives and limits on OHVs would help meet these objectives.

Impact Analysis. **Table 5-24** shows Acres of Travel Management Designations in GRSG Habitat in MZ IV.

As shown in **Table 5-24**, none of the action alternatives would contribute to the acres of GRSG habitat designated as open to cross-country motorized travel in MZ IV, with the exception of Alternative B, which would contribute all of the GHMA open in MZ IV. The Proposed Plan would contribute the greatest amount of PHMA designated as closed in MZ IV compared to other action alternatives but would not contribute as many acres of GHMA as closed as Alternatives A, B, E, or F. Acres of GRSG habitat in MZ IV with limited designations do not vary substantially across the action alternatives with the exception of Alternatives B and C, which contribute little or no limited GHMA.

Table 5-24
Acres of Travel Management Designations in GRSG Habitat in MZ IV

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ IV	Percent Within Sub-Region	MZ IV	Percent Within Sub-Region
Open				
Alternative A	2,769,000	100%	1,125,000	>99%
Alternative B	0	0%	1,125,000	>99%
Alternative C	0	0%	1,000	0%
Alternative D	0	0%	1,000	0%
Alternative E	0	0%	1,000	0%
Alternative F	0	0%	1,000	0%
Proposed Plan	0	0%	1,000	0%
Limited				
Alternative A	7,485,000	9%	8,329,000	2%
Alternative B	10,253,000	33%	8,329,000	2%
Alternative C	11,575,000	41%	8,131,000	0%
Alternative D	10,261,000	33%	9,445,000	14%
Alternative E	10,253,000	33%	9,453,000	14%
Alternative F	10,253,000	33%	9,453,000	14%
Proposed Plan	10,897,000	37%	9,068,000	10%
Closed				
Alternative A	587,000	4%	204,000	17%
Alternative B	587,000	4%	204,000	17%
Alternative C	622,000	9%	168,000	0%
Alternative D	614,000	8%	176,000	5%
Alternative E	587,000	4%	204,000	17%
Alternative F	587,000	4%	204,000	17%
Proposed Plan	640,000	11%	177,000	5%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within travel management designations of open, limited and closed in MZ IV; it also displays the percentage of those acres that are found within the sub-region.

For recreation, Alternatives B and D and the Proposed Plan would aim to reduce impacts on GRSG with issuance of SRPs and RSUAs. Alternative F would take a similar approach, but with the addition of seasonal restrictions within 4 miles of active leks. Alternative E would require SETT consultation upon issuance of SRPs/RSUAs within GRSG habitat to avoid, minimize, and mitigate impacts on GRSG consistent with the Nevada state plan. These alternatives

would have the greatest potential benefits to GRSG and its habitat by incorporating specific GRSG-related management. Alternatives A and C would not manage recreation to reduce impacts on GRSG and may therefore have the greatest impact on GRSG and its habitat.

Reasonably foreseeable recreation in MZ IV is expected to increase over the 20-year analysis period (**Section 5.1.16**). However, state and private GRSG conservation efforts as well as other BLM and Forest Service Proposed Plans in MZ IV would reduce the threat by providing additional protections such as disturbance caps and limitations on National Forest System lands. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ IV.

5.1.11 Existing Conditions in WAFWA MZ V

This section summarizes existing conditions and past and present actions for the Nevada and Northeastern California Sub-region (provided in more detail in Chapter 3) and for MZ V as a whole. Reasonably foreseeable future actions are discussed in **Section 5.1.13**.

GRSG Habitat and Populations

MZ V consists of four GRSG populations: Central Oregon, Klamath, Warm Springs Valley, and Western Great Basin (USFWS 2013a, p. 25-26), and the Nevada and Northeastern California Sub-region contains three of these populations: portions of the Western Great Basin, the Warm Springs Valley, and Klamath populations. The entirety of the Klamath population occurs in the Nevada and Northeastern California Sub-region. MZ V represents the westernmost extent of the GRSG range and contains a mix of habitat issues that have had long-term effects on GRSG populations. GRSG leks in MZ V are relatively well connected (second in connectedness only to the Wyoming Basin; Knick and Hanser 2011); however, the COT Report identifies habitat loss and fragmentation due to wildfire and conifer encroachment as primary threats to GRSG in the MZ (USFWS 2013a).

In MZ V, state and private lands account for over 2 million acres of GRSG habitat (approximately 17 percent of habitat), with BLM-administered and other federal land accounting for over 10.3 million acres of habitat (approximately 80 percent of habitat) (Manier et al. 2013, p. 118). Additionally, BLM-administered federal mineral estate that may exist with other surface ownership, often referred to as split-estate lands, exists within MZ V. The higher percentage of GRSG habitat on BLM-administered and other federal land means BLM management could play a key role in alleviating threats to GRSG in MZ V.

Table 5-25 provides a breakdown of landownership and acres of GRSG habitat in MZ V. As the table shows, approximately 72 percent of priority habitat and

Table 5-25
Management Jurisdiction in MZ V by Acres of Priority and General Habitats

	Total Surface Area (Acres)	Priority Habitat (Acres)	General Habitat (Acres)	Non-habitat (Acres)
MZ V	36,447,900 (100%)	7,097,200 (19%)	5,808,000 (16%)	23,542,700 (65%)
BLM	14,179,800 (39%)	5,117,500 (72%)	4,196,700 (72%)	4,865,600 (21%)
Forest Service	10,136,000 (29%)	62,200 (<1%)	114,900 (2%)	9,958,900 (42%)
Tribal and other federal	1,964,700 (5%)	717,100 (10%)	101,800 (2%)	1,145,800 (5%)
Private	6,299,000 (17%)	798,000 (11%)	1,199,000 (21%)	4,302,000 (18%)
State	473,600 (1%)	64,900 (<1%)	115,800 (2%)	292,900 (1%)
Other	3,394,700 (9%)	337,500 (5%)	79,800 (1%)	2,977,400 (13%)

Source: Manier et al. 2013, p. 118

72 percent of general habitat is on BLM-administered lands. Only a small percentage of priority habitat and general habitat is located on National Forest System lands (less than 1 percent of priority habitat and 2 percent of general habitat in MZ V is on National Forest System lands). As a result, the contribution of National Forest System lands to cumulative effects in MZ V will not be discussed further.

The percentage of BLM-administered surface area in the MZ is high. This suggests that BLM actions in MZ V likely will have a greater impact on ameliorating major threats to GRSG than comparable actions on private and state lands.

Population Trends in Management Zone V

Of the seven management zones, MZ V is characterized as one of those supporting the highest densities of GRSG. MZ V consists of three GRSG populations, Western Great Basin, Warm Springs Valley, and Central Oregon, and a fourth, small and fragmented population, Klamath (Manier et al. p. 133). The Klamath population is entirely within the Nevada and Northeastern California Sub-region.

The range of GRSG in MZ V has continued to shrink in extent over the last three decades, while some populations within MZ V are relatively stable. When considered in its entirety, population change from 1965 to 2004 was statistically undetectable (Connelly et al. 2004), declining by 3.3 percent by some measures (Connelly et al. 2004), and by 2 percent by others (Garton et al. 2011). However, populations in MZ V as a whole declined 65 percent over the 2007 to 2013 period (Garton et al. 2015, p. 19). Garton et al. (2015, p. 19) predicted a 13.6 percent chance that populations within MZ V will fall below 200 males in the short term (by 2045), and a 92.3 percent chance that populations within MZ V will fall below 500 males in the long term (by 2115).

5.1.12 Regional Efforts to Manage Threats to GRSG

Regional efforts include past, present, and reasonably foreseeable actions conducted by the BLM and by other federal and/or in cooperation with non-federal agencies, organizations, landowners, or other groups in MZ V. These efforts would be applicable on state and private lands in the sub-region, which contain approximately 3.6 million acres (28 percent) of GRSG habitat (Manier et al. 2013, p. 118). The boundaries of MZ V encompass portions of the states of Oregon, Nevada, and California. Regional efforts occurring in these states are discussed below.

Other BLM and Forest Service Planning Efforts

The BLM has incorporated management of SFAs into its proposed management approach for GRSG, as described in **Section 5.1.4**. There are two SFAs comprising 2,593,700 acres in MZ V as a whole. The Sheldon-Hart Mountain NWR Complex Area (1,910,500 acres) in southeast Oregon and northwest Nevada is entirely within MZ V. The Southeast Oregon/North-Central Nevada SFA is mostly within MZ IV, though a 683,200-acre portion is within MZ V.

Other BLM and Forest Service planning efforts are described in **Section 5.1.4**.

Oregon Statewide Efforts

Oregon statewide efforts are described in **Section 5.1.8**, Regional Efforts to Manage Threats to GRSG in MZ IV.

Nevada/California State Efforts

Nevada and California statewide efforts are described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ III.

Natural Resources Conservation Service Sage Grouse Initiative

The Natural Resources Conservation Service's (NRCS) Sage Grouse Initiative (SGI) is described in **Section 5.1.4**, Regional Efforts to Manage Threats to GRSG in MZ III. SGI efforts in MZ V are described here.

As of 2015, SGI has secured conservation easements on over 455,000 acres across the GRSG range (NRCS 2015), with the largest percentage of easements occurring in Wyoming (approximately 200,000 acres). In MZ V, SGI has thus far secured conservation easements on 28,871 acres that maintain intact sagebrush-grassland habitat. It has also accomplished the following:

- Established over 88,000 acres where grazing management promotes GRSG habitat and sustainable ranching
- Removed conifers encroaching on 175,595 acres of GRSG habitat
- Seeded over 1,000 acres with native plants
- Marked 80 miles of fences in GRSG territory

Other Regional Efforts

Tribes, counties, and local working groups are also playing a critical role in promoting GRSG conservation at the local level. Individual conservation plans have been prepared by some local working groups in MZ V to develop and implement strategies to improve or maintain GRSG habitat and reduce or mitigate threats on the local level. The proposed conservation actions and recommendations in these plans are voluntary actions for private landowners. Local working group projects have included monitoring, research, and mapping habitat areas, as well as public outreach efforts such as landowner education and collaboration with federal, state, and other local entities. These efforts provide a conservation gain to GRSG through increased monitoring and public awareness. Local working groups in MZ V include the Prineville, Lakeview, Burns, and Vale local working groups in Oregon (Portions of Burns and Vale are also within MZ IV, and an additional group in Oregon, Baker, is entirely within MZ IV), and the Washoe/Modoc and North Central Nevada local working groups in Nevada (the Washoe/Modoc group is also partially in California, and both groups are also within MZ III) (USGS 2014).

5.1.13 Relevant Cumulative Actions

This cumulative effects analysis considers the incremental impact of the Nevada and Northeastern California LUPA and alternatives in combination with other past, present, and reasonably foreseeable future federal and non-federal actions on lands in MZ V (see **Table 5-39**). Where these actions occur within GRSG habitat, they would cumulatively add to the impacts of BLM-authorized activities set forth in the Nevada and Northeastern California LUPA. In addition to the conservation efforts described above, relevant reasonably foreseeable future cumulative actions occurring on federal, state, private, or mixed land ownership in MZ V are described in the Proposed Oregon Sub-region RMPA, which is incorporated by reference.

The following list includes past, present, and reasonably foreseeable future actions in MZ V that, when added to the Proposed Plan and alternatives for the Nevada and Northeastern California Sub-region, could cumulatively affect threats to GRSG:

- Wagontire Wind Energy Development Project, Harney County, Oregon
- Buckskin Mountain Wind Energy Development Project, Harney County, Oregon
- Several ongoing locatable minerals mining operations in Harney and Lake Counties, Oregon
- North Steens 230-kV Transmission Line Project, Harney County, Oregon

- West Butte Wind Power ROW Project, Crook and Deschutes Counties, Oregon
- Vya PMU Programmatic Habitat Restoration and Fuels Reduction Project, northeast California and northwest Nevada
- Northeastern California Juniper Treatment Project, northeast California and northwest Nevada
- North Steens Ecosystem Restoration Project, Harney County, Oregon
- South Warner Sagebrush Sage-Grouse Habitat Restoration, Lake County, Oregon
- Five Creeks Rangeland Restoration Project, Harney County, Oregon
- Steens Mountain Comprehensive Recreation Plan, Harney County, Oregon
- Greater Sage-Grouse Programmatic Candidate Conservation Agreement for Rangeland Management Practices on BLM Lands, Oregon
- Integrated Invasive Plant Management Environmental Assessments for Burns, Lakeview, Prineville, and Vale Districts
- Wildhorse Gathers EAs

5.1.14 Threats to GRSG in Management Zone V

In its COT report, the USFWS identifies wildfire, spread of invasive plants, conifer encroachment, infrastructure development, livestock grazing and free-roaming equids, conversion to agriculture, energy development, and recreation as the present and widespread threats facing GRSG in MZ V (USFWS 2013a, pp. 25-26). Each threat is discussed in this section.

For those threats below that are analyzed quantitatively (infrastructure, livestock grazing, conversion to agriculture, energy development and mining, and recreation), acres presented in the analyses tables represent acres of land allocations from each of the Nevada and Northeastern California Sub-region LUPA/EIS alternatives in the Nevada and Northeastern California Sub-region portion of MZ V, combined with acres of land allocations from the Proposed Plans of additional BLM and Forest Service sub-regions in the non-Nevada and Northeastern California Sub-region portion of MZ V. The Oregon Sub-region is the only other sub-region within MZ V.

Wildfire

Nature and Type of Effects. The impacts of wildfire on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the sub-region and MZ V. Wildfire has been a primary threat to GRSG habitats and populations occurring across MZ V, with 67 percent of priority habitat and general habitat having high risk for wildfire, including the Western Great Basin and Central Oregon population areas (Manier et al. 2013, p. 133). Since 2000, approximately 1.6 million acres (17 percent of priority habitat and 6 percent of priority habitat) of GRSG habitats have burned in this MZ, with an average of more than 95,000 acres of priority habitats burned annually and a maximum yearly burn of nearly one million acres (Manier et al. 2013, p. 83). Wildfires on BLM-administered lands contribute 88 percent of average acres burned in this MZ annually (Manier et al. 2013, p. 82-83). In 2012, the Rush Fire burned more than 265,000 acres of PACs in California and more than 313,000 acres in Nevada, comprising portions of the Western Great Basin population; this wildfire also affected most of the largest leks in the region and may have isolated subpopulations through removal of connectivity habitat (USFWS 2013a, p. 83). Also in 2012, the Lone Willow portion of the Western Great Basin population was affected by the Holloway Fire, which burned approximately 221,000 acres in Oregon and 140,000 acres in Nevada of habitat considered important or essential for GRSG (USFWS 2013a, p. 84). In 2012, the Miller Homestead and Long Draw fires in southeastern Oregon burned 160,800 and 558,200 acres, respectively, mostly on BLM-administered lands with significant losses of GRSG habitat (BLM 2013i).

Impact Analysis. Management actions in the Nevada and Northeastern California Sub-region that emphasize wildfire suppression in GRSG habitat would benefit the species by limiting habitat loss in the event of wildfire. As discussed in *Wildfire* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of wildfire and would be in accordance with the COT objective for this threat. As discussed above, BLM actions in the sub-region could be expected to considerably affect GRSG habitat in MZ V due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ.

Recognition of the importance of sagebrush habitat during interagency wildfire response would benefit GRSG in the event of an unplanned fire. The State of Nevada GRSG conservation plan discussed in **Section 5.1.6** would benefit GRSG habitat in the MZ. Voluntary conservation recommendations in the Oregon state plan, while not currently a regulatory mechanism in the state, would help reduce threats from wildfire if implemented on projects requiring state agency review or approval, or by private landowners. These programs would benefit GRSG during wildfire planning and response throughout MZ V, particularly on lands not administered by the BLM.

The Interagency Standards for Fire and Fire Aviation Operations “Red Book” includes BMPs for GRSG habitat conservation for wildlife and fuels management (BLM 2013n). This document is a supplemental policy or guidance for the BLM, the Forest Service, and the USFWS. These BMPs could benefit the GRSG during

interagency wildland fire operations by using spatial habitat data and predictive services to prioritize and preposition firefighting resources in critical habitat areas. However, since several years have elapsed since GRSG BMPs were incorporated, benefits would likely now be apparent, and it is unclear if this is currently the case. In January 2015, Secretarial Order 3336 “Rangeland Fire Prevention, Management and Restoration” was signed by the Secretary of the Interior. The order sets forth enhanced policies and strategies for preventing and suppressing rangeland wildfire and for restoring sagebrush landscapes impacted by wildfire across the West for the DOI. The order will improve coordination with local, state, tribal, and regional efforts to address rangeland wildfire at a landscape level.

Reasonably foreseeable wildland fire management efforts are projected to increase (**Section 5.1.16**), especially through increased coordination of federal, state, and local fire prevention actions and the implementation of the Oregon Sub-region BLM RMPA in MZ V. When the impacts of the Nevada and Northeastern California Sub-region LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V.

However, in those years where wildfires that threaten wildland-urban interface are widespread, firefighting resources would be shifted to those areas and away from GRSG habitat. Years with extensive involvement of wildland-urban interface in wildfires may not see the expected benefits of policies and direction intended to increase wildfire response in GRSG habitat.

Spread of Invasive Plants

Nature and Type of Effects. The impacts of invasive plants on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and MZ V. Via seeds carried by wind, humans, machinery, and animals, invasive plants have invaded and will continue to invade many locations in MZ V. Some species, including cheatgrass, have become so ubiquitous that it is considered economically infeasible to attempt to eradicate them, such as those areas that have crossed a threshold that precludes their returning to traditional plant community composition through normal plant succession. Modeling has suggested that more than 5.6 million acres of GRSG habitat MZ V are considered to be at a moderate to high risk for cheatgrass occurrence (Manier et al. 2013, p. 90).

The BLM currently manages invasive plant infestations through integrated weed management, including biological, chemical, mechanical, manual, and educational methods. It is guided by the 1991 and 2007 RODs for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991a) and by the 2007 Programmatic Environmental Report (BLM 2007a). The BLM also participates in the National Early Warning and Rapid Response System for Invasive Species.

The goal of this system is to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes (FICMNEW 2003). Invasive plants are managed in cooperation with county governments and represent a landscape-level approach across management jurisdictions.

Impact Analysis. Increased surface disturbance, motorized transportation, and animal and human activity would increase the chance for the establishment and spread of invasive plants. As discussed in *Spread of Invasive Plants* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of invasive plants and would be in accordance with the COT objective for this threat. Other alternatives would also reduce the threat of invasive plants relative to the No Action Alternative. As discussed above, BLM actions in the sub-region could be expected to considerably affect GRSG habitat in MZ V due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ.

Relevant cumulative actions that result in surface-disturbing activities would increase the potential for the spread of invasive plants on both federal and non-federal lands. The Nevada state plan includes stipulations for including control of noxious and invasive plant species and use of native seed mixes during reclamation, as well as addresses invasive species considerations in wildfire management. Voluntary conservation guidelines in the Oregon state plan include methods to prevent, detect, treat, and restore areas of invasive plant infestation. These stipulations and guidelines would benefit GRSG core habitat areas by limiting the spread or establishment of invasive species, particularly on lands that lack BLM protective regulatory mechanisms. A number of projects are ongoing or in the planning phase to treat nonnative, invasive plants in MZ V (see **Section 5.1.3** above and **Table 5-39** for additional information).

Reasonably foreseeable invasive plant management efforts are projected to increase (**Section 5.1.16**), including other state and county noxious weed regulations and the implementation of the Oregon Sub-region BLM RMPA in MZ V. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V. The Proposed Plan may result in the greatest net conservation gain due to its 3 percent anthropogenic disturbance cap that should reduce potential for the spread of weeds during the 20-year analysis period.

Conifer Encroachment

Nature and Type of Effects. The impacts of conifer encroachment on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Conifer encroachment risk is high on approximately 1.4 million acres of GRSG habitat in MZ V (Manier et al. 2013, p.

93). Approximately 73 percent of conifer encroachment risk in priority habitat (and 65 percent in general habitat) occur on BLM-administered lands within MZ V (Manier et al. 2013, p. 94). In comparison, 13 percent of conifer encroachment risk in priority habitat (and 25 percent in general habitat) occur on private lands and 1 percent in priority habitat occurs on National Forest System lands (5 percent in general habitat). Therefore, BLM actions are likely to have a greater potential to ameliorate the effects of conifer encroachment on GRSG in both priority habitat and general habitat than any other single land management entity.

Impact Analysis. The COT objective for conifer encroachment is to remove conifer woodlands from areas of sagebrush that are most likely to support GRSG (post-removal) at a rate that is at least equal to the rate of encroachment (USFWS 2013a, p. 47). As discussed in *Conifer Encroachment* in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of conifer encroachment. As discussed above, BLM actions in the sub-region could be expected to considerably affect GRSG habitat in MZ V due to the amount of GRSG habitat on BLM-administered lands in the sub-region relative to the wider MZ.

Relevant cumulative actions on federal, private, and state lands within the MZ include several large conifer removal projects (see **Table 5-39**). Additional actions in MZ V include conifer removal projects guided by existing California BLM field office RMPs in the southern portion of MZ V, which incorporate the Sage Steppe Ecosystem Restoration Strategy (BLM 2008f). This strategy includes conifer removal projects in specific project areas. Further, the NRCS includes conservation measures to remove encroaching conifers near leks and lek seasonal habitats while minimizing disturbance to GRSG (NRCS 2012, p. 13). SGI has helped reduce the threat of early succession conifer encroachment through mechanical removal on 175,595 acres of private lands within MZ V. The majority of these efforts were located inside PACs (NRCS 2015), helping to preserve historic fire return intervals and important GRSG habitat. The Nevada state plan provides management actions for treating early-phase conifer encroachment. Similarly, the Oregon state plan provides voluntary conservation measures for treating early-phase juniper expansion.

Reasonably foreseeable conifer encroachment management efforts are projected to increase (**Section 5.1.16**), including efforts on private land and implementation of the Oregon Sub-region BLM RMPA in MZ V. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V. The Proposed Plan would have the greatest reduction in the threat from conifer encroachment and provides a net conservation gain to GRSG. Alternatives D and E would also reduce the threat, though to a lesser degree than the Proposed Plan because they do not specify acres for treatment or habitat objectives.

Infrastructure

Rights-of-Way

Nature and Type of Effects. The impacts of ROWs on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Infrastructure, such as ROWs and associated facilities and urbanization, is widespread throughout MZ V. In some locations, infrastructure development has affected GRSG habitat. Development of roads, fences, and utility corridors has also contributed to habitat loss and fragmentation in portions of MZ V. The best available estimates suggest about 20 percent of MZ V is within approximately 4 miles of urban development (Knick et al. 2011, p. 214). Impacts of infrastructure development in MZ V are primarily related to highways, roads, power lines, and communication towers, with 95 percent of MZ V within 4 miles of a road, 15 percent within 4 miles of a power line, and 5 percent within 4 miles of a communication tower (Knick et al. 2011, pp. 215-216).

Although not representative of all infrastructure ROWs, transmission lines greater than 115 kilovolts indirectly influence 26 percent of priority habitat and 33 percent of general habitat across MZ V. Indirect effects are assumed to occur to a radius of 4 miles (Manier et al. 2013, p. 41). Approximately 77 percent of transmission lines in priority habitat and 64 percent in general habitat are on BLM-administered lands across GRSG habitats in MZ V (Manier et al. 2013, p. 41). In contrast, private and National Forest System lands contain 13 percent and 1 percent of transmission lines in priority habitat, respectively, and 27 percent and 2 percent in general habitat, respectively. Therefore, BLM actions are likely to have the greatest potential to affect transmission line ROWs in GRSG habitat than any other land management entity. Designating ROW exclusion and avoidance areas in PHMA and GHMA on BLM-administered lands could reduce the threat on these lands. However, in areas with scattered federal landownership, infrastructure may be routed around federal lands, often increasing its length and impact. ROW avoidance and exclusion areas on BLM-administered lands could increase this tendency.

Impact Analysis. **Table 5-26** provides a quantitative summary of ROW conditions on BLM-administered lands across MZ V. As shown in the table, the largest impacts on GRSG would result from Alternatives B, C, and F, which would designate PHMA as ROW exclusion. Alternative F would also manage GHMA as ROW exclusion. Alternatives D and the Proposed Plan would designate PHMA as ROW avoidance, and though Alternative E would not designate PHMA, measures in the Nevada state plan for ROW permitting would be similar to ROW avoidance in PHMA. These actions are reflected in the ROW avoidance portion of **Table 5-26**.

Table 5-26
Acres of Rights-of-Way Designations in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Open to Rights-of-Way				
Alternative A	1,678,000	97%	1,095,000	94%
Alternative B	57,000	2%	65,000	0%
Alternative C	57,000	2%	65,000	0%
Alternative D	57,000	2%	65,000	0%
Alternative E	57,000	2%	65,000	0%
Alternative F	57,000	2%	65,000	0%
Proposed Plan	91,000	40%	102,000	36%
Right-of-Way Exclusion				
Alternative A	964,000	74%	460,000	38%
Alternative B	2,608,000	90%	460,000	38%
Alternative C	3,816,000	93%	284,000	0%
Alternative D	1,142,000	78%	284,000	0%
Alternative E	967,000	74%	460,000	38%
Alternative F	2,608,000	90%	1,493,000	81%
Proposed Plan	965,000	74%	459,000	38%
Right-of-Way Avoidance				
Alternative A	2,031,000	0%	3,353,000	0%
Alternative B	2,031,000	0%	4,386,000	24%
Alternative C	2,031,000	0%	3,353,000	0%
Alternative D	3,672,000	45%	4,386,000	24%
Alternative E	3,672,000	45%	4,386,000	24%
Alternative F	2,031,000	0%	3,353,000	0%
Proposed Plan	3,663,000	45%	4,324,000	22%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within rights-of-way designations in MZ V; it also displays the percentage of those acres that are found within the sub-region.

The acres in **Table 5-27** depict existing utility corridors in GRSG habitat in MZ V. As shown in **Table 5-27**, the contribution from the Nevada and Northeastern California Sub-region would not differ substantially across alternatives. Under the Proposed Plan, acres of utility corridors in GRSG habitat in MZ V would be somewhat reduced relative to the No Action and other alternatives. Under Alternative C, the contribution of acres of utility corridors in PHMA in MZ V would be slightly more than other alternatives.

Table 5-27
Acres of Existing Utility Corridors in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Alternative A	120,000	53%	122,000	47%
Alternative B	120,000	53%	122,000	47%
Alternative C	130,000	57%	0	0%
Alternative D	123,000	55%	118,000	45%
Alternative E	120,000	53%	122,000	47%
Alternative F	120,000	53%	122,000	47%
Proposed Plan	97,000	42%	38,000	34%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within existing and proposed utility corridors in MZ V; it also displays the percentage of those acres that are found within the sub-region.

Projects in the Nevada portion of MZ V that require state agency review or approval would be subject to the Nevada state plan (SETT 2014a) approval and consultation process. This would require project avoidance of GRSG core habitat, or minimization of impacts and mitigation for any remaining impacts on GRSG habitat through the state conservation credit system. Oregon has also developed a state plan (Hagen 2011) to achieve no net loss of GRSG core habitat from development; however, management guidelines in the plan, including avoidance, design features, and mitigation, are generally voluntary. Thus, the current Oregon plan may not be as protective of GRSG habitat as plans containing regulatory mechanisms for GRSG conservation on private lands, such as the Nevada state plan. However, the Oregon Sage-Grouse Action Plan currently under development will provide regulatory mechanisms for GRSG conservation on private and state lands. While the current Oregon plan is composed of voluntary management guidelines, the guidelines may be used by state regulatory agencies, including the Energy Facility Siting Council as conditions of approval on a case-by-case basis for certain energy projects. For example, the council has jurisdiction on wind energy projects greater than 105 MW (Dave Budeau, phone conversation with author, March 26, 2015). Because they would manage the most GRSG habitat as ROW exclusion, Alternatives C

and F would provide the greatest net conservation gain to GRSG in MZ V and are most likely to meet the COT report objective, which is to avoid development of infrastructure in GRSG priority areas for conservation.

The effect of the alternatives and other conservation actions in the MZ (most notably the Nevada state plan) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other important areas that do not follow geopolitical boundaries.

Reasonably foreseeable ROW development in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as implementation of the Oregon Sub-region BLM RMPA in MZ V would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future ROW developments would be further reduced. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ V by providing the greatest amount of ROW exclusion in GRSG habitat. The Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site ROWs with the least impact on GRSG habitat.

Renewable Energy: Wind and Solar

Nature and Type of Effects. The impacts of renewable energy on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Wind energy development is an increasing threat in some populations within MZ V. Renewable energy development, including wind, have been identified as a threat to GRSG habitat in portions of Oregon's Western Great Basin population (Hagen 2011), with at least two proposed projects currently authorized and others in planning stages (see **Table 5-39**). No commercial-scale wind developments have currently been constructed in MZ V.

No current solar energy facilities measurably affect GRSG within the range (however, USFWS did identify small solar developments in California and Wyoming in the listing decision) (Manier et al. 2013, p. 66), and solar resources comparable to the areas where utility-scale solar production projects are being proposed or built are generally not present in MZ V. However, given technological developments, transmission infrastructure, and market forces within the lifespan of this analysis, solar potential across the southern range of GRSG, including within MZ V, may become attractive to solar development projects (Manier et al. 2013, p. 66). Several solar facilities under 5 MW are

currently in operation in MZ V (Renewable Northwest Project 2015), and several additional solar facilities ranging in size from less than 1 MW to 12 MW are currently in the planning (Bend Bulletin 2015), permitting, or development stages (County of Lake 2015, Renewable Northwest Project 2015).

The numbers of ROW authorizations, including wind and solar ROWs, are anticipated to grow in the sub-region. Increasing populations and continued renewable energy development, including proposed wind projects in the sub-region, drive the need for new ROWs on both federal and non-federal lands. Geothermal energy development is discussed under *Energy Development and Mining*, below.

Impact Analysis. **Table 5-28** provides a quantitative summary of renewable energy (wind) development conditions on BLM-administered lands across MZ V. As shown in the table, Alternative C would have the greatest contribution to acres of GRS habitat open to wind ROWs in MZ V; however, the total acreage open is small under this alternative. Alternatives C, D, and F would contribute the most acres of GRS habitat managed as exclusion and would be the most protective of GRS habitat and its habitat. Though Alternative E would not designate PHMA or GHMA, core and priority habitats designated under this alternative would be equivalent to PHMA and GHMA, respectively, and additional stipulations and the Nevada state plan's avoid, minimize, mitigate strategy would apply to wind ROW developments and would provide additional protections over Alternative A. Under the Proposed Plan, PHMA would be managed as exclusion for commercial wind facilities. GHMA would be ROW avoidance for wind facilities. Wind developments would also be subject to the anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs consistent with applicable law, buffers, and a mitigation requirement.

Table 5-28
Acres of Wind Energy Management Designations in GRS Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
	Open to Wind Rights-of-Way			
Alternative A	1,623,000	100%	1,030,000	100%
Alternative B	0	0%	0	0%
Alternative C	1,000	100%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%

Table 5-28
Acres of Wind Energy Management Designations in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Wind Right-of-Way Exclusion				
Alternative A	2,301,000	31%	425,000	41%
Alternative B	3,945,000	60%	425,000	41%
Alternative C	5,153,000	69%	249,000	0%
Alternative D	4,120,000	62%	1,282,000	81%
Alternative E	2,304,000	31%	425,000	41%
Alternative F	3,945,000	60%	1,458,000	83%
Proposed Plan	3,969,000	60%	424,000	41%
Wind Right-of-Way Avoidance				
Alternative A	750,000	0%	3,437,000	0%
Alternative B	750,000	0%	4,470,000	23%
Alternative C	750,000	0%	3,437,000	0%
Alternative D	750,000	0%	3,437,000	0%
Alternative E	2,391,000	69%	4,470,000	23%
Alternative F	750,000	0%	3,437,000	0%
Proposed Plan	750,000	0%	4,445,000	23%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within wind energy management designations in MZ V; it also displays the percentage of those acres that are found within the sub-region.

Across MZ V, the Oregon RMPA/EIS Proposed Plan would exclude solar and wind development in SFAs and would allow for wind and solar ROW avoidance as opposed to exclusion in PHMA in Lake, Harney, and Malheur Counties. In the Nevada and Northeastern California Sub-region, wind and solar installations could be considered in PHMA only to provide power for an existing facility; these approvals would be subject to a net conservation gain for GRSG.

In Nevada, new wind ROW authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in the SGMA under the Nevada state conservation plan for GRSG. These stipulations would benefit GRSG in the Nevada and Northeastern California portion of MZ V by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat from ROWs developments. Oregon has also developed a state plan to achieve no loss of GRSG core habitat from

development as discussed under the *Rights-of-Way* subheading of **Section 5.1.14**. However, because measures in the plan are not currently required by a regulatory mechanism within the state, the Oregon plan may not be as protective of GRSG habitat as plans containing regulatory mechanisms for GRSG conservation on private lands, such as the Nevada state plan.

The effect of the alternatives and other conservation actions in the MZ (most notably the Nevada state plan) could be synergistic. By implementing restrictions on infrastructure in PHMA and on state and private lands together, the cumulative beneficial effect on GRSG would be greater than the sum of their individual effects because protections would be applied more consistently across the landscape. This is especially important in areas of mixed land ownership patterns where complementary protections can benefit leks, early brood-rearing habitat, or other important areas that do not follow geopolitical boundaries.

Reasonably foreseeable energy development in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as wind energy restrictions in the Oregon Sub-region BLM Proposed Plan in MZ V would reduce the threat by restricting the type and location of developments. When restrictions in the Nevada and Northeastern California LUPA are added to these conservation actions, the impacts of future energy developments would be further reduced. Alternatives C, D, and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ V by providing the greatest amount of wind exclusion in GRSG habitat. The Proposed Plan would also reduce the threat to a lesser degree by providing the flexibility to site energy developments with the least impact on GRSG habitat.

Livestock Grazing and Free Roaming Equids

Nature and Type of Effects. The impacts of livestock grazing and free-roaming equids on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Livestock grazing is present and widespread on many land types, including federal and private lands, across MZ V. Rangeland health assessments have found that nearly 12 percent (417,000 acres of priority habitat and 158,700 acres of general habitat) of BLM-administered grazing allotments in GRSG habitat in MZ V are not meeting wildlife standards with grazing as a causal factor (Manier et al. 2013, p. 97).

One of the most pervasive changes associated with grazing management in GRSG habitats throughout MZ V is the construction of fencing (Knick et al. 2011, p. 224). The Nature Conservancy of Oregon and the BLM Burns District (BLM 2013a) conducted a study of livestock fence GRSG collision risk in the district to identify potential fences for marking, relocation, or removal. Results of the study indicate that there are 52 miles of high-risk fence in the district.

Over 56 percent (2,190,000 acres of priority habitat and 1,476,300 acres of general habitat) of GRSG habitat within MZ V is federally managed wild horse and burro range (Manier et al. 2013, p. 102). Within MZ V, 31 percent of priority habitat and 25 percent of general habitat is negatively influenced by free-roaming equids (Manier et al. 2013, p. 103). Within MZ V, 91 percent of HMAs in priority habitat occur on BLM-administered lands, similarly 95 percent of HMAs in general habitat are on BLM-administered lands (Manier et al. 2013, p. 103) The BLM establishes an AML for each HMA, which represents the population objective.

Impact Analysis. **Table 5-29** provides a quantitative summary of acres available and unavailable to livestock grazing on BLM-administered land and across MZ V. As shown in the table, with the exception of Alternative C, the Nevada and Northeastern California LUPA action alternatives would have a similar contribution to acres available and unavailable to livestock grazing in GRSG habitat in MZ V. Alternative C would exclude livestock grazing from PHMA.

Table 5-29
Acres Available and Unavailable to Livestock Grazing in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Available to Livestock Grazing				
Alternative A	4,596,000	50%	4,758,000	25%
Alternative B	4,596,000	50%	4,758,000	25%
Alternative C	2,278,000	0%	3,572,000	0%
Alternative D	4,771,000	52%	4,584,000	22%
Alternative E	4,596,000	50%	4,758,000	25%
Alternative F	4,596,000	50%	4,758,000	25%
Proposed Plan	4,622,000	51%	4,733,000	25%
Unavailable to Livestock Grazing				
Alternative A	49,000	0%	102,000	0%
Alternative B	49,000	0%	102,000	0%
Alternative C	3,554,000	99%	102,000	0%
Alternative D	49,000	0%	102,000	0%
Alternative E	49,000	0%	102,000	0%
Alternative F	49,000	0%	102,000	0%
Proposed Plan	49,000	0%	102,000	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA available and unavailable to livestock grazing in MZ V; it also displays the percentage of those acres that are found within the sub-region.

As discussed in *Livestock Grazing and Free Roaming Equids* in **Section 5.1.6**, the alternative that most reduces acres available for grazing would not necessarily have the greatest benefit on GRSG populations and habitat. Given these considerations, and because the Proposed Plan contains additional measures that would improve GRSG habitat as discussed in **Section 5.1.6**, the Proposed Plan would provide the greatest benefit to GRSG of all the alternatives.

Relevant cumulative actions that improve grazing management with respect to GRSG within MZ V include rangeland health improvements through the NRCS SGI. These improvements are described in *Livestock Grazing and Free Roaming Equids* in **Section 5.1.6**. Within MZ V, SGI has implemented 88,306 acres of prescribed grazing systems. This program is likely the largest and most impactful program on private lands within MZ V. Because of its focus on priority areas for conservation, which often overlap PHMA, the SGI's past, present, and reasonably foreseeable work has had and likely will continue to have a cumulative beneficial impact on GRSG when considered alongside protective BLM management actions in PHMA.

Reasonably foreseeable livestock grazing management efforts in MZ V are expected to increase over the analysis period (**Section 5.1.16**), through increased NRCS conservation actions under the Sage-Grouse Initiative (e.g., fence marking and conservation easements), state efforts to maintain ranchland, and the implementation of the Oregon Sub-region BLM RMPA in MZ V. When grazing management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V.

Under all alternatives the BLM has the authority to adjust wild horse and burros AMLs if resource damage occurs; however, only Alternatives B through F and the Proposed Plan provide management guidelines specific to GRSG habitat, which would benefit the species more than Alternative A. Under most action alternatives, management actions and range improvements for wild horses and burros would follow management action for livestock range improvements and be aligned with GRSG habitat objectives, as described in **Section 5.1.6**.

Reasonably foreseeable wild horse management efforts are projected to increase over the analysis period (**Section 5.1.16**) with implementation of the Oregon BLM RMPA in MZ V. When wild horse management within the Nevada and Northeastern California LUPA is added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V. Impacts may be reduced to the greatest extent under the Proposed Plan, where AMLs would be evaluated with consideration of GRSG habitat objectives for BLM-administered lands.

Conversion to Agriculture

Nature and Type of Effects. The impacts of agricultural conversion on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Regional assessments estimate that while only 1 percent of priority habitat and general habitat in MZ V are directly influenced by agricultural development, over 66 and 85 percent of priority habitat and general habitat, respectively, are within approximately 4 miles of agricultural land and are therefore negatively indirectly affected (Manier et al. 2013, p. 28).

Impact Analysis. The BLM does not convert public lands to agriculture. As such, the only direct authority these agencies have over conversion to agriculture is by retaining or disposing of lands in the realty program. Lands retained under BLM and Forest Service management will not be converted to agriculture, and disposing of lands could increase the likelihood they will be converted to agriculture, depending on their location and new management authority.

Table 5-30 provides a quantitative summary of acres identified for retention and disposal on BLM-administered across MZ V. As shown in the table, the Nevada and Northeastern California LUPA/EIS action alternatives for acres of PHMA identified for retention would not vary substantially across alternatives and would have a similar contribution to acres identified for retention across MZ V. Alternative C would retain approximately twice the PHMA as the other alternatives in the sub-region, which would translate to additional retained acres of PHMA across MZ V. Since Alternatives B, C, D, and F would retain all PHMA in public ownership, acres of PHMA identified for disposal under these alternatives would be zero. Current land tenure retention guidance include retaining lands supporting threatened and endangered species and species of high interest, and existing California BLM field office RMPs and PMU conservation strategies specify retention of GRSG habitat, which would mean that GRSG habitat would be retained under the No Action Alternative. Under the Proposed Plan, PHMA would be retained unless there is a net conservation gain to GRSG by disposal of PHMA.

Table 5-30
Acres Identified for Retention and Disposal in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
	Acres Identified for Retention			
Alternative A	4,612,000	49%	4,823,000	24%
Alternative B	4,665,000	50%	4,823,000	24%
Alternative C	5,871,000	60%	3,686,000	0%

Table 5-30
Acres Identified for Retention and Disposal in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Alternative D	4,840,000	52%	4,717,000	22%
Alternative E	4,612,000	49%	4,823,000	24%
Alternative F	4,665,000	50%	4,823,000	24%
Proposed Plan	4,684,000	50%	4,804,000	23%
Acres Identified for Disposal				
Alternative A	122,000	100%	112,000	100%
Alternative B	0	0%	68,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	53,000	100%	68,000	100%
Alternative F	0	0%	68,000	100%
Proposed Plan	7,000	100%	61,000	100%

Source: BLM 2015

This table displays the acres of PHMA and GHMA identified for retention and disposal in MZ V; it also displays the percentage of those acres that are found within the sub-region.

Cumulative impacts vary relatively little across alternatives because BLM management has little impact on alleviating this threat. Restrictions on grazing on federal land could increase agricultural pressure on adjacent private lands. If the loss of federal grazing rights makes ranching economically unviable, the potential conversion of private grazing lands to agriculture could increase. However, the Proposed Plan does not substantially increase acreage unavailable to grazing.

The COT report objectives for converting land to agriculture are to avoid further loss of sagebrush habitat for agricultural activities (both plant and animal production) and to prioritize restoration. In areas where taking agricultural lands out of production has benefited GRSG, the programs supporting these actions should be targeted and continued (USFWS 2013a, p. 48). In accordance with this objective, the NRCS's SGI program focuses on maintaining rangeland that provides habitat for GRSG, as described under *Conversion to Agriculture* in **Section 5.1.6**. As of 2014, SGI has secured conservation easements on 28,871 acres within MZ V and marked or removed 80 miles of fence (NRCS 2015). This has preserved habitat and reduced the risk of direct mortality on these lands.

As discussed in **Section 5.1.6**, the Proposed Plan would provide the greatest protections for GRSG populations and habitat of all alternatives from the threat of agricultural conversion. Over the analysis period, conversion to agriculture is expected to increase (**Section 5.1.16**), though state and private conservation efforts as well as implementation of the Oregon Sub-region BLM RMAP in MZ V would reduce the threat. When land tenure decisions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in net conservation gain to GRSG habitats and populations in MZ V.

Energy Development and Mining

The COT report states that energy development should be designed to ensure that it will not impinge on stable or increasing GRSG population trends. For energy development and mining, the COT report objective is to maintain stable to increasing GRSG populations and no net loss of GRSG habitats in areas affected by mining (USFWS 2013a, p. 49).

Energy development and mining within MZ V is generally limited to geothermal energy development and wind energy development. Wind development is discussed under the *Renewable Energy* subheading above. No coal or oil and gas development is presently occurring in MZ V; mining activities, including for mineral materials, locatable minerals, and nonenergy minerals, within the sub-region is limited, as discussed under *Mineral Materials, Locatable Minerals, and Nonenergy Leasable Minerals*, below.

Oil and Gas

Nature and Type of Effects. The impacts of oil and gas development on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and MZ V. Oil and gas development in habitats used by GRSG and construction of accompanying transmission lines, roads, and pipelines began in the late 1800s with the discovery of oil in the Interior West (Connelly et al. 2004). However, locations of geologic fields for traditional oil and gas (Copeland et al. 2013) suggest the greatest potential for oil and gas development is across the eastern portion of GRSG range (MZs I, II/VII, and eastern MZ III) (Manier et al. 2013, p. 51). No active oil and gas wells currently exist in MZ V (Manier et al. p. 52), and no measurable additional acreage has been leased for fluid mineral exploration within MZ V (Manier et al. 2013, p. 55).

For the Oregon Sub-region, no RFD scenario for oil and gas development was developed for the RMPA/EIS; instead, future-looking estimates are based on broad-scale “trends” review, as described in **Chapter 5** of the Oregon Sub-Region RMPA/EIS. The potential for impacts from oil and gas development would be reduced where areas are closed to fluid mineral leasing or where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law, the likelihood for impacts on GRSG habitat on BLM-administered lands in the Oregon Sub-region portion of MZ V is

anticipated to be small and localized. Though an RFD scenario was produced for the Nevada and Northeastern California Sub-region (**Appendix P**), oil and gas disturbance within the MZ V portion of the sub-region is also anticipated to be small and localized. There are two oil-producing basins in the sub-region; both are located in MZ III and/or IV in central-eastern Nevada: Railroad Valley in Elko County and Pine Valley in Eureka County (**Section 3.13**).

Although oil and gas activities on private lands would not be subject to BLM regulatory oversight, regulatory mechanisms on both federal surface and split-estate lands in MZ V would be influential should fluid mineral development occur. Development on BLM-administered split-estate lands would require mitigation for impacts on GRSG habitat on private surface lands that would not be required on lands with both privately held surface and mineral estate.

Impact Analysis. **Tables 5-31** and **5-32** provide a quantitative summary of fluid mineral leasing conditions on BLM-administered and National Forest System lands across MZ V.

Table 5-31
Acres Open* and Closed to Fluid Mineral Leasing in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Open* to Fluid Mineral Leasing				
Alternative A	1,623,000	100%	1,030,000	100%
Alternative B	0	0%	1,031,000	100%
Alternative C	1,000	100%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%
Closed to Fluid Mineral Leasing				
Alternative A	1,666,000	43%	1,336,000	13%
Alternative B	3,310,333	71%	1,335,000	13%
Alternative C	4,519,000	79%	1,159,000	0%
Alternative D	1,845,000	48%	1,159,000	0%
Alternative E	1,669,000	43%	1,335,000	13%
Alternative F	3,310,000	71%	2,368,000	51%
Proposed Plan	1,670,000	43%	1,334,000	13%

Source: BLM 2015

*Open with standard stipulations. This table displays the acres of PHMA and GHMA open and closed to fluid mineral leasing in MZ V; it also displays the percentage of those acres that are found within the sub-region.

Table 5-32
Acres with NSO and CSU/TL Stipulations in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
NSO Stipulations				
Alternative A	1,718,000	0%	350,000	0%
Alternative B	1,718,000	0%	350,000	0%
Alternative C	1,718,000	0%	350,000	0%
Alternative D	3,359,000	49%	1,383,000	75%
Alternative E	1,718,000	0%	350,000	0%
Alternative F	1,718,000	0%	350,000	0%
Proposed Plan	3,384,000	49%	350,000	0%
CSU/TL Stipulations				
Alternative A	0	0%	2,279,000	0%
Alternative B	0	0%	2,279,000	0%
Alternative C	0	0%	2,279,000	0%
Alternative D	0	0%	2,279,000	0%
Alternative E	1,641,000	100%	3,312,000	31%
Alternative F	0	0%	2,279,000	0%
Proposed Plan	0	0%	3,288,000	31%

Source: BLM 2015

This table displays the acres of PHMA and GHMA with NSO Stipulations and CSU/TL Stipulations in MZ V; it also displays the percentage of those acres that are found within the sub-region.

As shown in **Tables 5-31** and **5-32**, fluid mineral closures and stipulations within the Nevada and Northeastern California Sub-region exert a fairly large influence on closures or stipulations within MZ V as a whole. Alternatives B, D, E, and F and the Proposed Plan would all reduce the amount of open acres in PHMA within MZ V relative to the No Action Alternative. Alternatives C and F would close the most GRSG habitat to fluid mineral leasing and would therefore be the most protective of GRSG and its habitat. As such, reasonably foreseeable future leasing projects would be less likely to impact GRSG populations on federal lands. Alternative D and the Proposed Plan would impose major constraints on the greatest amount of PHMA, and the Proposed Plan would provide additional protections to GRSG from fluid mineral development by requiring anthropogenic disturbance criteria, a 3 percent disturbance cap, buffers, mitigation requirements, RDFs consistent with applicable law, and by managing SFAs as NSO with no waivers, exceptions, and modifications.

All BLM and Forest Service Proposed Plans within MZ V include BMPs (consistent with applicable law) to minimize impacts on GRSg from oil and gas development on federal lands. In areas where mineral estate is currently unleased, these tools can be applied to future leases; in areas that are already leased, RDFs can be applied consistent with applicable law as conditions of approval for development of existing leases. Similarly, state plans contain similar measures to reduce impacts. Together, these measures would help protect unfragmented habitats, minimize habitat loss and fragmentation, and maintain conditions that meet GRSg life history needs. Recent research indicates that restored habitats lack many of the features sought by GRSg in their habitat areas and may not support GRSg for long periods following restoration activities. In order to conserve GRSg populations on the landscape, protecting existing habitat by minimizing development would provide the best hope for GRSg persistence (Arkle et al. 2014).

Reasonably foreseeable oil and gas development is limited in the MZ. When the impacts of the Nevada and Northeastern California LUPA are added to these actions, the impact would be a net conservation gain due in large part to implementation of NSO stipulations, anthropogenic disturbance caps, and adaptive management that would minimize future disturbances to GRSg populations and habitats.

In Nevada, new oil and gas leases or authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in the SGMA under the Nevada state conservation plan for GRSg. These stipulations would benefit GRSg in the MZ V portion of the sub-region by ensuring that projects avoid, minimize, and mitigate impacts on GRSg habitat. Oregon has also developed a state plan to achieve no net loss of GRSg core habitat from development as discussed under the *Rights-of-Way* subheading of **Section 5.1.14**. However, because measures in the plan are not currently required by a regulatory mechanism within the state, the Oregon plan may not be as protective of GRSg habitat as plans containing regulatory mechanisms for GRSg conservation on private lands, such as the Nevada state plan.

The effect of the Nevada and Northeastern California LUPA alternatives and other past, present, and reasonably foreseeable future conservation actions in the MZ (most notably the Nevada state plan) could be synergistic, meaning that the effects of the actions together is greater than the sum of their individual effects. For example, applying buffers in PHMA and on state and private land would effectively conserve larger blocks of land than if these actions occurred individually. This would provide a landscape-scale net conservation benefit, especially in areas where little development has occurred to date.

Reasonably foreseeable oil and gas development in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSg conservation efforts as well as implementation of the Oregon Sub-region

BLM RMPA in MZ V would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V. Alternatives C and F would provide the greatest net conservation gain to GRSG habitats and populations in MZ V by providing the greatest amount of GRSG habitat closed to leasing. The Proposed Plan would also reduce the threat to a lesser degree through designation of NSO stipulations and additional conservation measures.

Geothermal

Nature and Type of Effects. The impacts of geothermal development on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and MZ V. Current geothermal energy production within the GRSG range is primarily within MZs III, IV, and V. Approximately 10,900 acres of geothermal leases on priority habitat and 31,800 acres of leases on general habitat currently exist in MZ V (Manier et al. 2013, p. 71). This acreage represents less than 1 percent of total GRSG habitat in the MZ.

The RFD scenario for the Nevada and Northeastern California Sub-region (**Appendix P**) predicts up to 12 new geothermal power plants and estimates between 53 and 367 acres of disturbance would be required for each plant. Therefore, between 636 and 4,404 acres of temporary and permanent disturbance associated with geothermal development over the next 20 years is expected under the No Action Alternative throughout the sub-region on both BLM and National Forest System lands. The conservative assumption that all 4,404 acres of disturbance would be located within MZ V, on PHMA, would mean that less than 1 percent of PHMA within MZ V would be directly affected under this scenario. It is reasonable to assume that not all 4,404 acres of disturbance would occur within GRSG habitat. This acreage would be reclaimed after operations cease or wells are abandoned. However, indirect impacts from such development would affect a considerably larger area than the direct footprint of development, as discussed for several threats above. Typical geothermal development includes roads, transmission lines, and associated linear features in addition to power plant development, and as discussed above, these features may contribute to spread of invasive plants, habitat fragmentation, and increased predation on GRSG.

Under the RFD scenario for the action alternatives, estimated disturbance would generally decrease between 0 and 70 percent relative to the No Action Alternative. The potential for impacts would be reduced where areas are closed to fluid mineral leasing and where NSO and CSU/TL stipulations are applied. Given the small acreage and implementation of RDFs consistent with applicable law (**Appendix D**), the likelihood for impacts on GRSG habitat is anticipated to be small and localized under all alternatives, including the No Action Alternative.

The potential for impacts from geothermal development would be reduced where areas are closed to leasing and where stipulations are applied. Given the relatively small acreage of projected geothermal development, and implementation of the disturbance cap, stipulations, RDFs consistent with applicable law, and mitigation, the likelihood for impacts on GRSG habitat on BLM-administered lands is anticipated to be small and localized under all alternatives.

Impact Analysis. The quantitative analysis of effects from geothermal leasing would be the same as described for oil and gas because allocations and past, present, and reasonably foreseeable future actions would be the same.

Coal

Nature and Type of Effects. The impacts of coal development on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. There are currently no direct or indirect effects from surface coal leases in the MZ (Manier et al. 2013, p. 74). There are no leasable coal deposits in the Nevada and Northeastern California Sub-region (**Section 3.13**). This threat will not be described further for this MZ.

Mineral Materials

Nature and Type of Effects. The impacts of mineral materials on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. There are 111,400 acres of mining sites for mineral materials and locatable minerals on BLM-administered surface land on priority habitat and general habitat in MZ V. This total does not include minerals mined as energy sources. There are 119,300 acres of mining sites across all landownership types, making BLM-administered land the largest contributor to potential direct effects from this threat (82 percent of potentially affected priority habitat and 74 percent of potentially affected general habitat, respectively, are on BLM-administered lands). National Forest System lands do not contribute to direct effects on priority habitat and general habitat (Manier et al. 2013, p. 78).

GRSG may be directly impacted by mining and mineral materials disposal sites by being in the path of development; however, indirect impacts on habitat affect a much wider population of birds. Manier et al. (2013, p. 77) estimate that indirect impacts from this type of development extend 1.5 miles from the development footprint. Therefore, direct and indirect impacts taken together affect 800,900 acres of priority habitat and general habitat on BLM-administered lands in MZ V. National Forest System lands indirectly affect only 1,500 acres of GRSG habitat in MZ V (Manier et al. 2013, p. 78).

Impact Analysis. **Table 5-33** provides a quantitative summary of acreages of BLM-administered lands open and closed to mineral material disposal across MZ V. As shown in the table, both Alternatives A and E would contribute substantially more acres of PHMA open to mineral disposal in MZ V. Under the other action alternatives, PHMA would be closed to mineral material disposal. Under Alternative E, core habitat would be open to mineral materials disposal but would require SETT consultation under the Nevada state plan. Alternatives B, C, D, and F and the Proposed Plan would all contribute substantially to PHMA acres closed in MZ V; Alternative D would have the greatest contribution and would potentially have the greatest benefit for GRSG populations and habitat.

Table 5-33
Acres Open and Closed to Mineral Material Disposal in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Open to Mineral Material Disposal				
Alternative A	1,623,000	100%	3,646,000	28%
Alternative B	0	0%	3,646,000	28%
Alternative C	1,000	100%	2,615,000	0%
Alternative D	0	0%	2,615,000	0%
Alternative E	1,621,000	100%	3,646,000	28%
Alternative F	0	0%	3,646,000	28%
Proposed Plan	0	0%	3,621,000	28%
Closed to Mineral Material Disposal				
Alternative A	3,384,000	21%	1,350,000	13%
Alternative B	5,028,000	47%	1,349,000	13%
Alternative C	6,237,000	57%	1,174,000	0%
Alternative D	5,204,000	49%	2,207,000	47%
Alternative E	3,387,000	21%	1,349,000	13%
Alternative F	5,028,000	47%	1,349,000	13%
Proposed Plan	5,053,000	47%	1,349,000	13%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open and closed to mineral material disposal in MZ V; it also displays the percentage of those acres that are found within the sub-region.

Despite not contributing the most acres closed within MZ V, the Proposed Plan would provide additional protections that would provide the greatest benefit to GRSG populations and habitat. The Proposed Plan would close PHMA to new mineral materials sales, though PHMA would remain open to expansion of existing pits. The Proposed Plan would also require anthropogenic disturbance criteria, a 3 percent disturbance cap, RDFs consistent with applicable law, buffers, and mitigation. These closures and restrictions would reduce the effect on GRSG from mineral material development on BLM-administered in MZ V compared to the action alternatives. However, these actions may shift development onto non-federal lands, with potentially greater impacts on GRSG. This is because similar protective stipulations and permit requirements might not apply on those other lands.

In Nevada, new mineral material leases or authorizations that require state agency review or approval would be subject to the permitting process and stipulations for development in the SGMA under the Nevada state conservation plan for GRSG. These stipulations would benefit GRSG in the Nevada and Northeastern California Sub-region portion of MZ V by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat. Oregon has also developed a state plan to achieve no net loss of GRSG core habitat from development as discussed under the *Rights-of-Way* subheading of **Section 5.1.14**. However, because measures in the plan are not currently required by a regulatory mechanism within the state, the Oregon plan may not be as protective of GRSG habitat as plans containing regulatory mechanisms for GRSG conservation on private lands, such as the Nevada state plan.

Reasonably foreseeable mineral materials development in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as implementation of the Oregon Sub-region BLM RMPA in MZ V would reduce the threat by restricting the location of developments and requiring mitigation. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V.

Locatable Minerals

Nature and Type of Effects. The impacts of locatable minerals management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Current locatable mineral exploration and production in MZ V is limited and includes diatomaceous earth, limestone, perlite, sunstone, bentonite, gold, silver, and copper.

Impact Analysis. **Table 5-34** provides a quantitative summary of acreages of BLM-administered lands open to and recommended for withdrawal from mineral entry across MZ V.

Table 5-34
Acres Open and Recommended for Withdrawal from Locatable Mineral Entry
in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Open to Locatable Mineral Entry				
Alternative A	3,167,000	68%	4,326,000	26%
Alternative B	1,013,000	<1%	4,326,000	26%
Alternative C	1,013,000	<1%	3,204,000	0%
Alternative D	3,258,000	69%	4,324,000	24%
Alternative E	3,167,000	68%	4,326,000	26%
Alternative F	1,013,000	<1%	4,326,000	26%
Proposed Plan	2,769,000	63%	4,300,000	25%
Recommended for Withdrawal from Locatable Mineral Entry				
Alternative A	1,170,000	0%	5,000	0%
Alternative B	3,346,000	65%	5,000	0%
Alternative C	4,470,000	74%	5,000	0%
Alternative D	1,170,000	0%	5,000	0%
Alternative E	1,170,000	0%	5,000	0%
Alternative F	2,176,000	100%	5,000	0%
Proposed Plan	1,593,000	27%	5,000	0%

Source: BLM 2015

This table displays the acres of PHMA and GHMA open to mineral entry and recommended for withdrawal from locatable mineral entry in MZ V; it also displays the percentage of those acres that are found within the sub-region.

As shown in the table, Alternatives A, D, E and the Proposed Plan would contribute most of the PHMA open to locatable entry in MZ V. Contributions of GHMA open would not differ substantially, with the exception of Alternative C and the Proposed Plan. Alternatives B, C, and F would recommend PHMA for withdrawal, and would contribute most or all of the PHMA recommended for withdrawal from locatable mineral entry in MZ V. While acres of PHMA would still be available for locatable mineral entry under the Proposed Plan, additional protections under this alternative would provide the greatest benefit to GRSG populations and habitat compared to the other action alternatives as discussed in **Section 5.1.6**. This includes recommending SFAs for withdrawal from locatable mineral entry, which would help protect the highest-quality habitat for GRSG. However, implementation of this alternative could push development onto private lands with fewer restrictions, thereby increasing impacts on GRSG.

In Nevada, new locatable mineral leases or authorizations that require state agency review or approval would be subject to the state permitting process and stipulations for development in the SGMA under the Nevada state conservation plan for GRSG. These stipulations would benefit GRSG in the Nevada and Northeastern California Sub-region portion of MZ V by ensuring that projects avoid, minimize, and mitigate impacts on GRSG habitat. Oregon has also developed a state plan to achieve no net loss of GRSG core habitat from development as discussed under *Rights-of-Way* in **Section 5.1.14**. However, because measures in the plan are not currently required by a regulatory mechanism within the state, the Oregon plan may not be as protective of GRSG habitat as plans containing regulatory mechanisms for GRSG conservation on private lands, such as the Nevada state plan.

Reasonably foreseeable locatable mineral development in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**), though state and private GRSG conservation efforts as well as implementation of the Oregon Sub-region BLM RMPA in MZ V would reduce the threat by applying RDFs as Conditions of Approval. The disturbance caps in the Proposed Plans would not block locatable mineral entry projects, but any locatable mineral entry would be considered as disturbance under the cap. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V.

Nonenergy Leasable Minerals

Nature and Type of Effects. The impacts of nonenergy leasable minerals management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Existing leases for nonenergy leasable minerals represent a relatively small threat across the range of GRSG (Manier et al. 2013, p. 71). No current nonenergy leasable development is present in MZ V (Manier et al. 2013, p. 79), and nonenergy leasable minerals are not discussed further for this MZ.

Recreation

Nature and Type of Effects. The impacts from recreation management on GRSG are described in **Section 4.2** and above in **Section 5.1.6**.

Conditions in the Sub-region and in MZ V. Human populations have increased and expanded, primarily over the past century and in the western portion of the sagebrush distribution (Knick et al. 2011, p. 212). With these expanding populations come greater human impacts (Leu et al. 2008), including from recreational uses of BLM and National Forest System lands. Uninhabited areas within the Great Basin ecoregion (portions of MZs III, IV, and V) decreased 90 percent (from 22.2 million acres to less than 3 million acres), with expansion

driven in part by economic and recreation opportunities in the region (Torregrosa and Devoe 2008, p. 10).

The COT report objectives for recreation are to maintain healthy native sagebrush communities, based on local ecological conditions, and to manage direct and indirect human disturbance (including noise) to avoid interruption of normal GRSG behavior (USFWS 2013a, p. 49). Limits on road use under the action alternatives and limits on OHVs would help meet these objectives.

In the Oregon sub-region, the BLM has designated all BLM-administered lands as open, limited, or closed to OHV travel. This policy has resulted in the implementation of a system of designated or existing roads and trails whereby cross-country travel is only allowed in specified areas; however, most areas in Oregon are currently designated open. Similarly, the Forest Service has published Motor Vehicle Use Maps for nine National Scenic Areas, National Grasslands, and National Forests in the sub-region. The remaining four National Forests are currently undergoing travel management planning (**Chapter 3** of the Oregon Sub-Region RMPA/EIS). In the Nevada and Northeastern California Sub-region, travel management planning is complete for all National Forest System lands (**Section 3.10**).

Impact Analysis. **Table 5-35** shows Acres of Travel Management Designations in GRSG Habitat in MZ V.

Table 5-35
Acres of Travel Management Designations in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Open				
Alternative A	742,000	100%	513,000	100%
Alternative B	0	0%	513,000	100%
Alternative C	0	0%	0	0%
Alternative D	0	0%	0	0%
Alternative E	0	0%	0	0%
Alternative F	0	0%	0	0%
Proposed Plan	0	0%	0	0%
Limited				
Alternative A	3,687,000	39%	4,162,000	15%
Alternative B	4,425,000	49%	4,162,000	15%
Alternative C	5,554,000	59%	3,553,000	0%
Alternative D	4,521,000	50%	4,586,000	23%

Table 5-35
Acres of Travel Management Designations in GRSG Habitat in MZ V

	Priority Habitat Management Areas		General Habitat Management Areas	
	MZ V	Percent Within Sub-Region	MZ V	Percent Within Sub-Region
Alternative E	4,428,000	49%	4,678,000	24%
Alternative F	4,428,000	49%	4,678,000	24%
Proposed Plan	4,469,000	49%	4,652,000	24%
Closed				
Alternative A	247,000	71%	215,000	39%
Alternative B	247,000	71%	215,000	39%
Alternative C	331,000	78%	131,000	0%
Alternative D	330,000	78%	131,000	0%
Alternative E	247,000	71%	215,000	39%
Alternative F	247,000	71%	215,000	39%
Proposed Plan	247,000	71%	215,000	39%

Source: BLM 2015

This table displays the acres of PHMA and GHMA within travel management designations of open, limited and closed in MZ V; it also displays the percentage of those acres that are found within the sub-region.

As shown in **Table 5-35**, none of the action alternatives would contribute to the acres of GRSG habitat designated as open to cross-country motorized travel in MZ V, with the exception of Alternative B, which would contribute all of the GHMA open in MZ V. For acres closed to cross-country motorized travel, Alternatives C and D would contribute the most acres of PHMA in MZ V, though these two alternatives would contribute the least amount of GHMA. All other alternatives would contribute the same amount of closed acres in GRSG habitat in MZ V. For acres designated as limited in PHMA, Alternative A contributes slightly less than, and Alternative C contributes slightly more than, the other action alternatives. As a result of travel management planning, impacts on GRSG from recreational motorized vehicle use would be greatest under Alternative A; impacts would be reduced most under Alternatives C, D, and the Proposed Plan.

For recreation, Alternatives B, D, and the Proposed Plan would aim to reduce impacts on GRSG with issuance of SRPs and RSUAs. Alternative F would take a similar approach, but with the addition of seasonal restrictions within 4 miles of active leks. Alternative E would require SETT consultation upon issuance of SRPs/RSUAs within GRSG habitat to avoid, minimize, and mitigate impacts on GRSG consistent with the Nevada state plan. Alternatives A and C would not manage recreation to reduce impacts on GRSG.

Reasonably foreseeable recreation in MZ V is expected to increase over the 20-year analysis period (**Section 5.1.16**). However, state and private GRSG conservation efforts as well as implementation of the Oregon Sub-region BLM RMPA in MZ V would reduce the threat by providing additional protections such as disturbance caps and limitations on National Forest System lands. When restrictions within the Nevada and Northeastern California LUPA are added to these conservation actions, this would result in a net conservation gain to GRSG habitats and populations in MZ V.

5.1.15 Conclusions

In addition to BLM and Forest Service management in the Nevada and Northeastern California Sub-region and other sub-regions in MZs III, IV, and V, GRSG in these MZs will also be impacted by management and conservation at state, regional, tribal, and local levels. This cumulative effects analysis takes into account each alternative in the Nevada and Northeastern California LUPA in conjunction with state and private initiatives, as well as past, present, and reasonably foreseeable future actions at the federal, state, and local levels. The analysis assumes that the Proposed Plans would be implemented in the other BLM and Forest Service LUPA/RMPA sub-regions in MZs III, IV, and V.

Some of the most important past and present actions benefitting GRSG populations on private land in MZs III, IV, and V are the conservation easements coordinated by the NRCS SGI with private ranchers. SGI has also worked with landowners to develop compatible grazing systems, increase fence marking, seeding of native vegetation, and conifer removal to improve GRSG habitat quality. Future coordination of private landowners with SGI is expected to provide further benefits to GRSG habitat.

Coordination with private landowners enhances conservation in addition to what BLM and Forest Service management can accomplish on federal lands. In addition to SGI conservation easements, other coordination includes CCA or CCAA agreements between the USFWS and private, state, or federal landowners. CCA or CCAAs covering several million acres are in place or in preparation within MZ V, particularly in the Oregon Sub-region.

As discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**, Oregon, Nevada, Utah, and Montana have adopted statewide plans to promote GRSG conservation. The Montana plan implements a Core Population Area Strategy with well density limitations, timing restrictions, and a uniform 5 percent disturbance cap across all landownership types. These measures would improve GRSG population levels if effectively enforced (Copeland et al. 2013). The Utah executive order directs state agencies whose actions may affect GRSG to implement Utah Division of Wildlife Resources' *Conservation Plan for Greater Sage Grouse in Utah* (Utah Greater Sage-Grouse Working Group 2013). The conservation plan identifies 11 population areas in Utah that are the focus of GRSG conservation efforts, with the goal to protect, maintain, improve, and enhance GRSG

populations and habitats on public and private lands within the established management areas.

The Oregon and Nevada plans both define key GRSg habitat and provide measures to maintain, enhance, or restore habitats for GRSg. In Nevada, this is accomplished through project avoidance, design features, and compensatory mitigation through consultation with the state. While the Nevada plan provides a regulatory mechanism to reduce impacts on GRSg from development on non-BLM-administered or National Forest System lands, the Oregon plan generally includes voluntary guidelines. However, the Oregon Governor's natural resources department is currently in the process of developing regulations for GRSg conservation. The forthcoming Sage Grouse Conservation Action Plan will supplement the state plan and provide land use regulations and mitigations for Oregon core habitat areas.

Currently, a majority of MZ V, including the states of California and Oregon, and a majority of MZ IV, including the states of Idaho and Oregon, do not have regulatory mechanisms in place to protect GRSg habitat on non-BLM-administered or National Forest System lands. These states do have GRSg conservation plans, but these plans generally include voluntary guidelines, not regulatory mechanisms. This could allow for more impacts on the 17 percent of GRSg habitat in MZ V and the 31 percent of GRSg habitat in MZ IV that is state land or privately owned. Since most GRSg habitat in MZ V (74 percent) and IV (68 percent) is under federal management, BLM and Forest Service regulatory mechanisms will have a substantial contribution to cumulative effects.

BLM and Forest Service restrictions on ROWs, renewable energy, energy development, mining, and travel management and recreation in GRSg habitat would help reduce loss and disturbance of GRSg populations. The Nevada and Northeastern California LUPA Proposed Plan includes numerous measures to allow development while reducing the likelihood for impacts on GRSg, such as requirements for anthropogenic disturbance criteria, a 3 percent disturbance cap, buffers, mitigation, and RDFs consistent of applicable law, among other measures.

The most challenging threats to manage in MZs III, IV, and V are wildfire, the spread of invasive annual grasses, and conifer encroachment. Fire regimes are complex and vary tremendously across the sagebrush region and through time; furthermore, the ecological role of wildfire has changed dramatically since the European settlement era (circa 1850) due to changing fuel and habitat patterns (Manier et al. 2013, p. 79). Effects of wildfire are exacerbated by invasive plants, particularly in warm-dry sagebrush types, where the invasion by invasive annual grasses has resulted in an increase in the number and frequency of fires and decreased fire return intervals to the point where native sagebrush-steppe cannot recover, causing widespread, detrimental effects on habitat conditions (Manier et al. 2013, p. 88). Expansion of conifer woodlands, especially juniper

woodlands, do not provide suitable habitat for GRSG, and mature trees displace shrubs, grasses and forbs through direct competition (Manier et al. 2013, p. 91). These threats are at the landscape scale and are extensive throughout MZs III, IV, and V. The Nevada and Northeastern California LUPA Proposed Plan, along with other Proposed Plans for other sub-regions in MZs III, IV, and V, include comprehensive strategies to address these major threats.

Alternative A: Current Management

Under Alternative A, current management would continue on BLM-administered and National Forest System lands in the Nevada and Northeastern California Sub-region. Several protective measures would not be implemented; for example, the BLM and Forest Service would not designate PHMA or GHMA and would not manage any additional ROW avoidance or exclusion areas. Alternative A does not include any consistent management prescriptions to protect GRSG across the sub-region, though several individual BLM district offices and National Forests have some protections in place currently. Appropriate and allowable uses and restrictions with regard to such activities as mineral leasing and development, recreation, utility corridors, and livestock grazing would also remain unchanged.

Under current management, widespread wildfire and subsequent spread of nonnative, invasive plants have destroyed and degraded GRSG habitat throughout MZs III, IV, and V. Under Alternative A, this trend would likely continue, and the cycle of wildfire and invasive plant spread would continue. Further, the expansion of conifers at a rate exceeding treatment rates, particularly juniper, would continue to reduce the suitability of sagebrush habitats for GRSG throughout the MZs.

In the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. In addition, GRSG conservation strategies would be implemented on state and private lands under the various state plans, CCAs and CCAAs, and initiatives such as the NRCS SGI as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, the lack of protections under the Nevada and Northeastern California LUPA Alternative A would be partially offset by more protective management elsewhere in the MZs. Within the sub-region, though, continuation of current management would do little to reduce the major threats to GRSG in the sub-region: wildfire, invasive plants, and conifer encroachment. Current management provides a limited number and extent of regulatory mechanisms to avoid continued degradation of GRSG habitat in MZs III, IV, and V; however, current management would not meet the COT report objectives for conservation of GRSG. Current management direction in the existing LUPs does not explicitly address all elements of the COT report objectives. While nothing in the existing LUPs prevents vegetation treatments intended to address the threats of invasive plant

spread, conifer encroachment, and wildfire, there is less certainty that GRSG habitat would be the focus of management effort concerning these threats. Current management allows for more development than recommended by the COT report, potentially leading to greater fragmentation and increased risk that the unintentional spread of invasive plants would be facilitated.

Alternative B

Under Alternative B, the BLM and Forest Service would manage lands to conserve, enhance, and restore sagebrush ecosystems. In conjunction with NRCS and state initiatives on private land, several aspects of BLM and Forest Service management under Alternative B would benefit GRSG conservation at a landscape level. These include designation of PHMA and GHMA, implementation of RDFs consistent with applicable law, retention of GRSG habitat, restrictions on resource uses such as managing PHMA as ROW exclusion and recommended for locatable mineral withdrawal, managing grazing and free-roaming equids and wildfire fuels management using GRSG habitat objectives, and prioritizing restoration in GRSG habitat. Implementing these protective measures on BLM-administered and National Forest System lands within the Nevada and Northeastern California Sub-region would help reduce damage to GRSG habitat, minimize loss of connectivity, and minimize the spread of invasive plants by limiting human activities that disturb soil or introduce seeds. However, such restrictions could also risk pushing development onto adjacent, nonfederal lands with less restrictive management where land ownership patterns are mixed. This is particularly a concern where nonfederal lands have fewer protections (e.g., most of MZs IV and V where state plans currently lack regulatory mechanisms for GRSG conservation). In MZ III and parts of MZ IV, some nonfederal lands have similarly restrictive measures such as the SGMA in Nevada, Core habitat in Montana, and GRSG Management Areas in Utah, which would reduce the likelihood for impacts in these areas.

Under Alternative B, in the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. In addition, GRSG conservation strategies under the state plans, NRCS, and private initiatives would be implemented as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, protections under the Nevada and Northeastern California LUPA Alternative B would be in addition to protective management elsewhere in the MZs.

In combination with other past, present, and reasonably foreseeable future actions, Alternative B would likely meet the objectives laid out in the COT report for infrastructure, livestock grazing and free-roaming equids, conversion to agriculture, energy development, and recreation. However, because Alternative B lacks a comprehensive strategy to address fire, invasive plants, and conifer encroachment, it likely will not meet the COT objectives for these

major threats. In addition, the vague and very general language used in Alternative B increases the likelihood of differing interpretations during project development both within a given sub-region and across sub-regions, likely leading to project designs that are less consistent or outcomes that are less desirable for GRSG habitat conservation.

Alternative C

Under Alternative C, the BLM and Forest Service would manage lands to conserve, enhance, and restore sagebrush ecosystems. Management actions under Alternative C are applied to PHMA and focus on the complete removal of livestock grazing from the landscape to alleviate threats to GRSG. In conjunction with NRCS and state initiatives on private land, several aspects of BLM and Forest Service management under Alternative C would benefit GRSG conservation at a landscape level. These include implementation of RDFs consistent with applicable law, restrictions on resource uses such as managing PHMA as ROW exclusion and closed to mineral development, and retention of PHMA. Though Alternative C would result in removal of livestock grazing from BLM-administered and National Forest System lands, this action may have additional associated negative impacts on GRSG from the increased fencing in GRSG habitat required to accomplish this. Additionally, well-managed grazing can benefit GRSG habitat through reduction of fuels and reduced risk of wildfire severity.

Under Alternative C, in the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. In addition, GRSG conservation strategies under the state plans, NRCS, and private initiatives would be implemented as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, protections under the Nevada and Northeastern California LUPA Alternative C would be in addition to protective management elsewhere in the MZs. Together with other past, present, and reasonably foreseeable future actions, Alternative C would likely meet the objectives laid out in the COT report for infrastructure, conversion to agriculture, energy development, and recreation. Without a comprehensive strategy to address fire, invasive plants, and conifer encroachment, it likely would not meet the COT objectives for these major threats. Further, it is unknown whether removal of grazing would meet the COT objectives for range management, as analyzed above and in greater detail in **Section 4.2**. Because Alternative C draws on much of the language used in Alternative B, it would also likely result in differing interpretations within and across sub-regions, with less consistency and less desirable outcomes.

Alternative D

Under Alternative D, the BLM and Forest Service would manage lands to conserve, enhance, and restore sagebrush ecosystems. Management and impacts

would be similar to Alternative B, though Alternative D would incorporate more flexibility and adaptive management applied to resource uses to account for sub-regional conditions. The BLM and Forest Service would require a no net unmitigated loss of PHMA and GHMA and would implement numerous conservation measures to reduce impacts from human activities, such as RDFs consistent with applicable law, management of GRSG habitat as ROW avoidance areas, and closure to some mineral development. Alternative D also includes additional measures and planning for habitat restoration, vegetation, and wildfire management using GRSG habitat objectives, and for managing livestock grazing and free-roaming equids and wildfire fuels management using GRSG habitat objectives. Mitigation would be accomplished by specific measures and through the Nevada Conservation Credit System.

Under Alternative D, in the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. In addition, GRSG conservation strategies under the state plans, NRCS, and private initiatives would be implemented as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, protections under the Nevada and Northeastern California LUPA Alternative D would be in addition to protective management elsewhere in the MZs.

Under Alternative D, the BLM and Forest Service would increase GRSG habitat protection over current management, but with less restrictive actions than under Alternatives B or C. In conjunction with state and regional planning efforts, implementation of state measures in GRSG core areas in Nevada and Montana, and in GRSG Management Areas in Utah, conservation easements on private lands, implementation of other BLM and Forest Service LUPAs/RMPAs in MZs III, IV, and V, and other past, present, and reasonably foreseeable future actions, Alternative D would likely meet the objectives laid out in the COT report for fire, invasive plants, conifer encroachment, infrastructure, livestock grazing and free-roaming equids, conversion to agriculture, energy development, and recreation. However, because climate and weather factors that BLM cannot control often govern invasive plant spread and large wildfires, the ability of Alternative D to meet the COT report objectives for these two threats is less certain.

Alternative E

Under Alternative E, management actions developed by the State of Nevada would apply to BLM and National Forest System lands throughout the State of Nevada portion of the sub-region. Since the State of California did not submit management recommendations as part of this alternative, management actions in Alternative E would not apply to the California portion of the sub-region; instead, management actions in Alternative A would apply in the State of California. Under Alternative E, the BLM and Forest Service would manage to

maintain, conserve, enhance, and restore sagebrush ecosystems. Key elements of this alternative include achieving no net unmitigated loss of GRSG habitat by implementation of a strategy to avoid, minimize, and mitigate impacts on GRSG, and establishing the SETT and Nevada Conservation Credit System. Under Alternative E, the BLM and Forest Service would increase GRSG habitat protection over current management, but with less restrictive actions than under Alternatives B, C, or D.

Under Alternative E, in the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. However, as described above, portions of California within the sub-region would continue to be managed under current guidance (Alternative A). In addition, GRSG conservation strategies under the state plans, NRCS, and private initiatives would be implemented as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, protections under the Nevada and Northeastern California LUPA Alternative E would be in addition to protective management elsewhere in the MZs. In combination with other past, present, and reasonably foreseeable future actions, Alternative E would likely meet the objectives laid out in the COT report for infrastructure, grazing and free-roaming equids, conversion to agriculture, energy development, and recreation. However, because Alternative E lacks a comprehensive strategy to address fire, invasive plants, and conifer encroachment, it likely would not meet the COT objectives for these major threats.

Alternative F

Management under Alternative F would be largely similar to that described for Alternative B, though with more stringent guidance and restrictive management in sagebrush ecosystems. Livestock grazing and free roaming equids levels would be reduced by 25 percent.

Under Alternative F, in the remainder of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and GRSG habitat in those portions of MZs III, IV, and V outside of the Nevada and Northeastern California Sub-region. In addition, GRSG conservation strategies under the state plans, NRCS, and private initiatives would be implemented as discussed in **Sections 5.1.4, 5.1.8, and 5.1.12**. As a result, protections under the Nevada and Northeastern California LUPA Alternative F would be in addition to protective management elsewhere in the MZs. In combination with other past, present, and reasonably foreseeable future actions, Alternative F would likely meet the objectives laid out in the COT report for infrastructure, grazing/free-roaming equids, conversion to agriculture, energy development, and recreation. Without a comprehensive strategy to address fire, invasive plants, and conifer encroachment, it likely would not meet the COT objectives for these threats.

Proposed Plan

Under the Proposed Plan, the BLM and Forest Service would manage lands to conserve, enhance, and restore GRSG habitat and the sagebrush ecosystem upon which GRSG populations depend. Management and impacts would be similar to Alternative D, though the Proposed Plan would incorporate robust additional strategies and approaches to GRSG management, including wildfire and invasive species management, conifer removal, adaptive management, mitigation, a 3 percent disturbance cap, anthropogenic disturbance criteria, buffers, habitat objectives, and monitoring. In addition to habitat management areas, SFAs would also be managed to protect the most important areas for the species. The Proposed Plan provides vegetation treatment acres by decade sufficient to meet desired habitat conditions (70 percent of the analysis area meeting 10-30 percent sagebrush cover; NTT 2011).

The Proposed Plan would provide a higher level of GRSG habitat protection compared to current management, while allowing flexibility for resource uses when there would be no impacts on GRSG.

In the rest of MZs III, IV, and V, other BLM and Forest Service LUPA planning efforts would implement their Proposed Plans to improve protection of GRSG and their habitat. In addition, other regional GRSG conservation strategies as discussed in **Section 5.1.4, 5.1.8, and 5.1.12**, would be implemented on non-federal lands. Reasonably foreseeable future actions in MZs III, IV, and V such as proposed wind energy projects, geothermal development, vegetation management projects, interstate transmission lines, and other land disturbance projects would be subject to the requirements set forth in the BLM and Forest Service Proposed Plans that encompass the MZs, where those projects occur on federal decision area lands. For non-federal lands, reasonably foreseeable future projects may be subject to measures of GRSG state plans, as well as site-specific mitigation.

In conjunction with state and regional planning efforts, implementation of state conservation measures in GRSG core areas, conservation easements on private lands, implementation of other BLM and Forest Service LUPAs/RMPAs in MZs III, IV, and V, and other past, present, and reasonably foreseeable future actions, the Proposed Plan would help meet the objectives laid out in the COT report for wildfire, livestock grazing and free-roaming equids, conversion to agriculture, invasive plants, conifer encroachment, and recreation. Because climate and weather factors that BLM cannot control often govern the spread of invasive plant spread and large wildfires, the ability of the Proposed Plan to meet the COT report objectives for these two threats is less certain. Specifically, the following measures that would be implemented under the Proposed Plan, or are considered reasonably foreseeable future actions, would help meet COT report objectives:

- By prioritizing and conducting vegetation and fuels treatments based on GRSG habitat objectives, the Proposed Plan would increase the resistance of GRSG habitat to invasive annual grasses and the resiliency of GRSG habitat to disturbances such as fire and climate change to reduce habitat loss and fragmentation and help meet the COT report objective for wildfire.
- By reducing the area dominated by invasive annual grasses in GRSG habitat in accordance with the VDDT, the Proposed Plan would help meet COT report objective for invasive plants.
- By reducing encroaching conifer cover in GRSG habitat and near leks in accordance with the VDDT, the Proposed Plan would help meet the COT report objective for conifer encroachment.
- By managing livestock grazing and free-roaming equids to maintain or improve GRSG habitat, including prioritizing rangeland health assessments in GRSG habitat and completing assessments for GRSG habitat indicators within HMAs, the Proposed Plan would help meet COT report objectives for livestock grazing.
- By generally retaining GRSG habitat in land tenure transactions, the Proposed Plan would reduce fragmentation of GRSG habitat and help meet COT report objectives for agricultural conversion.
- By managing travel designations to conserve GRSG habitat and populations, the Proposed Plan would help meet COT report objectives for recreation.
- Continued implementation of the NRCS SGI would help meet the COT objective for the threat of agriculture conversion by securing conservation easements on private lands. Fence marking, implementing prescribed grazing systems, and vegetation seeding would help meet the COT objectives for range management structures, grazing, and nonnative, invasive plant species.
- Implementation of state conservation plans and/or state executive orders would help meet all COT report objectives, particularly on non-BLM-administered and non-National Forest System lands.

Summary

Overall, GRSG populations across MZs III, IV, and V face the greatest pressures from wildfire, invasive plants, and conifer encroachment. Additional threats include energy development, including wind and geothermal, infrastructure, mining, conversion to agriculture, and recreation. Due to the amount of federal lands in the MZs relative to other land ownerships, and in particular BLM-administered lands, BLM and Forest Service actions within the Nevada and Northeastern California Sub-region would contribute to cumulative effects on populations and habitats within MZs III, IV, and V.

Infrastructure projects are of particular concern in MZs III and IV, because such projects affect a large amount of land. Numerous multi-state transmission lines are proposed through GRSG habitat, as are utility-scale wind projects. Implementation of the BLM and Forest Service Proposed Plans in MZs III and IV are unlikely to preclude such projects from proceeding, especially Presidential Priority transmission line projects that are not subject to GRSG protective measures in the BLM and Forest Service LUPA planning efforts. However, GRSG protective measures are being considered in the project-specific analyses for these projects. The cumulative effect of the conservation measures in the Proposed Plan will result in protection of GRSG populations. Some small, localized populations may be at continued risk due to the cumulative effect of reasonably foreseeable future infrastructure and energy development projects over the next 20 years, when combined with unplanned events such as wildfires, drought, and associated decline in GRSG habitat quality. However, the Proposed LUPA/Final EIS restrictions on land use in combination with project-specific RDFs consistent with applicable law and other regional efforts would achieve an overall net conservation for the regional population and would help mitigate the effects on small, at-risk populations.

Of particular concern is that threat reduction for fire and invasive plants, especially invasive annual grasses, is difficult and costly. Given the intensity and widespread distribution of these threats, they may never be fully eliminated (USFWS 2013a, p. 40), but the comprehensive strategies for both fire and invasive plants under the Proposed Plan may be able to reduce the threat considerably.

Although small at-risk populations may continue to decline in the next 20 years, implementing the Proposed Plan in combination with other regional efforts (such as the Proposed Plans for other BLM and Forest Service sub-region LUPAs, conservation strategies in state plans, increased land protections through initiatives like the NRCS SGI, and local habitat restoration efforts) would contribute to conservation of GRSG populations in MZs III, IV, and V. Because Alternatives B, C, D, E, and F lack comprehensive strategies to manage wildfire, invasive plants, and/or conifer encroachment, these alternatives likely will not meet COT objectives for these major threats within MZs III, IV, and V.

5.1.16 MZ-Wide Reasonably Foreseeable Future Actions Summary Tables

Tables 5-36 through **5-38** include a selection of some of the larger projects from the reasonably foreseeable future actions tables in the RMPAs/LUPAs for MZs III, IV, and V. The full tables can be found in each EIS within each MZ.

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
Energy and Mining						
III	Utah	Carbon	South Unit Oil and Gas Development	Duchesne County, UT	Field development plan for leases held by Berry Petroleum; up to 356 new wells on up to 162 well pads may be drilled over the next 5 to 20 years; each well is subject to site-specific review and approval through the APD process. Includes GRSG mitigation.	Ongoing
III	Utah	Emery	Greens Hollow	Emery County, UT	Lease by application of 6,700 acres for coal extraction.	Planning phase
III	Utah	Emery	Flat Canyon Coal Lease by application	Sanpete County, UT	The Flat Canyon Coal Lease Tract is approximately 2,692 acres of federal coal reserves. Approximately 23 acres are within the Emery Population Area.	Forest Service completed consent to BLM
III	Utah	Panguitch	Alton Coal Tract SITLA	Kane County, UT	Add 3,576 acres of federal surface or mineral estate to existing 300-acre mine on private land.	Planning phase
III	Utah	Parker Mountain	Parker Knoll Pump Storage Hydro-electric Federal Energy Regulatory Commission Project	Piute County, UT	Create electricity using a two-reservoir, gravity-fed system; approximately 200 acres of GRSG habitat would be lost; mitigation involves GRSG habitat-improvement work in areas adjacent to the lost habitat.	Planning phase
III	Utah	Carbon	West Tavaputs Plateau Natural Gas Full Field Development Plan	Carbon County, UT	Project approved 626 well and 120 pads along with the infrastructure of roads, pipelines, compressor facilities and other facilities needed to produce oil and gas from the project area.	Ongoing
III	Utah	Carbon	Williams Draw Lease by Application	Emery County, UT	The proposed action includes 4,200 acres of federal surface and mineral estate; the proposal may have several vents, drilling exploration holes on the surface and underground, and load-out facilities.	Planning phase

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Utah	Carbon	Gasco Energy Inc. Uinta Basin Natural Gas Development Project	Uintah and Duchesne counties, UT	Approximately 206,826 acres west of the Green River and north of the Duchesne/Uintah and Carbon County line.	Ongoing
III	Utah	Sheeprocks	August 2015 Oil and Gas Lease Sale	Juab County, UT	Proposed sale of 9 parcels, approximately 12,943 acres, and subsequent lease issuance to successful bidders	Planning phase
III	Nevada and North-eastern California	Southern Great Basin	Long Canyon Mine	30 miles east of Wells, Nevada, and 32 miles west of West Wendover, Nevada, on Interstate 80.	Open-pit gold mining operation located on the east side of the Pequop Mountains. Operations would include one open pit, a heap leach pad, waste rock dump, tailing storage facility, and other ancillary facilities. The operator, Newmont Mining, is also proposing a natural gas pipeline for self-power generation on site. The pipeline would run from the Ruby pipeline south on existing ROWs to the project site, approximately 40 miles. The proposed disturbance acreage for operations is 2,116 acres, including public, private, and split-estate lands. The projected life of mine is 14 years, including construction, operations, and closure and post-closure monitoring.	Planning phase
III	Nevada and North-eastern California	Southern Great Basin	Salt Wells Geothermal Utilization Project	Nevada	120 MW power plant	Approved. Construction not initiated
Lands and Realty						
III	Utah; Nevada and North-eastern California; North-west Colorado; 9-Plan	Bald Hills; Sheeprocks; Southeast Nevada; Northwest Colorado; Wyoming Basin	Transwest Express	WY, UT, CO, NV	725 mile 600-kV transmission line.	Planning phase

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Utah; North-west Colorado; 9-Plan	Sheeprocks; Northwest Colorado; Wyoming Basin	Energy Gateway South Transmission Line EIS	WY, UT, CO	650-mile 500-kV transmission line	Planning phase
III	Utah; Nevada and North-eastern California; North-west Colorado; 9-Plan	Bald Hills; Sheeprocks; Southeast Nevada; Northwest Colorado; Wyoming Basin	Zephyr Transmission Line	WY, UT, CO, NV	500-kV transmission line	Planning phase
III	Utah	Carbon	Emery Telecom Ford Ridge Fiber Optic Line	Carbon and Utah counties, UT	Installation of 18.38 miles of fiber optic line (2.76 miles on BLM-administered lands); 13.06 miles of line would be buried along existing roads, and 5.32 miles would be attached to existing PacifiCorp power poles; the line would run from Helper, Utah, to the towers on Ford Ridge and back out to US Highway 6; the project would affect approximately 3.25 acres of BLM-administered lands.	Ongoing
III	Nevada and North-eastern California	Southeast Nevada	Southern Nevada Water Authority ROW	Begins near Ely, Nevada and ends northeast of Las Vegas, Nevada	241 miles of 230 kV, 69 kV, and 25 kV power lines; 258 miles of pipeline; ancillary facilities include pump stations, water treatment facility within corridor.	Ongoing
Fuels and Vegetation						
III	Utah	All populations in UT	Noxious weed treatments	UT	Noxious weed treatments	Ongoing
III	Utah	Sheeprock	Black Crook Treatment	Tooele County, UT	Treatment of 1,820 acres of pinion-juniper to enhance sagebrush habitat.	Ongoing
III	Utah	Sheeprock	Vernon Sage Harrow	Tooele County, UT	1,792 acres of treatment.	Ongoing

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Utah	Sheeprocks	Furner Valley Habitat Improvement Project	East Tintic Mountains	800 acres of treatment	Scheduled for Fall 2015
III	Utah	Carbon	Ford Ridge Fuels Reduction and Vegetation Restoration	Ford Ridge, UT	The project would remove dead and dying trees, and reduce live crown spacing by thinning the remaining live trees within approximately 6,840 acres	NEPA completed in 2013
III	Utah	Carbon	Cottonwood Ridge Pinyon-Juniper Treatment	Carbon County, UT/ West Tavaputs Plateau	The project would remove encroaching pinyon and juniper trees within 2,070 acres of BLM and State Surface	Planning phase
III	Utah	Carbon	Upper Anthro Lop and Scatter	Duchesne County, UT	Remove encroaching conifers from up to 11,800 acres of sagebrush and mountain brush communities on Anthro Mountain; project will maintain habitat for GRSG and sagebrush-obligate species.	Ongoing. Implementation over a 5- to 7-year period beginning in 2013.
III	Utah	Panguitch	Johns Valley Vegetation	Dixie National Forest, UT	Vegetation management project that includes 9,000 acres of treatment, including sagebrush.	Planning phase
III	Utah	Panguitch	Hodge Ranch and Angle Bench Vegetation Enhancement	Piute County, UT	Remove 1,500 acres of Phase I and II pinyon-juniper and up to 1,400 acres of sagebrush enhancement.	Planning phase
III	Utah	Parker Mountain	Boulder Foothills Fuels Reduction	Fishlake National Forest, UT	Mechanically treat 3,834 acres with bobcat and chainsaw, pile, and burn.	Ongoing
III	Utah	Parker Mountain	Porcupine Fuels Treatment	Fishlake National Forest, UT	Prescribe burn insect and disease infected conifer stands, and regenerate aspen within 35,000-acre analysis area.	Planning phase
III	Utah	Carbon and Emery	Shalom Timber Sale	Manti National Forest, UT	Timber and fuels management 9,000 acres; work to be accomplished through 2020; traditional timber harvest treatments, followed with prescribed burning treatments	Ongoing

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Utah	Emery	Swasey Wildlife Improvement and Hazardous Fuels Reduction Project	Emery County, UT	Multi-phase project that will treat a total of 8,422 acres; most of the project has been treated; phase IV (400 acres) was just submitted for funding; project is a combination of pinyon-juniper mastification and prescribed fire.	Ongoing
III	Utah	Panguitch	Upper Kanab Watershed Vegetation Creek	Kane County, UT	Vegetation management project that includes 51,600 acres of treatment in a 130,000 acres area over the next 15 years using a variety of treatment methods; average of 1,800 to 2,000 acres per year.	Ongoing
III	Utah	Parker Mountain	GRSG Habitat Improvement Projects	Piute and Garfield counties, UT	Over the next 10 years, a total of 40,000 acres of pinyon-juniper and sagebrush habitat will be improved for GRSG; a variety of mechanical treatments will be used to expand and improve existing habitat along the Parker Front. Yearly projects of 1,000-3,000 acres would be completed.	Ongoing
III	Utah	Hamlin Valley, Bald Hills, and Panguitch	Program-matic EA	Cedar City Field Office, UT	Vegetation management project to enhance previous treatments that have occurred over the past 60 years using a variety of management tools	Project under NEPA review; decision anticipated in 2014-2015
III	Nevada and North-eastern California	Southern Great Basin	Battle Mountain WUI EA	Battle Mountain District, NV	EA	Planning phase
III	Nevada and North-eastern California	Southern Great Basin	Overland Pass	Ruby Mountains Ranger District, NV	Fuels treatment.	Ongoing
III	Nevada and North-eastern California	Southern Great Basin	Spruce Mountain Restoration Project	Wells Field Office, NV	Restoration of up to 10,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources.	Ongoing

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Nevada and North-eastern California	Southern Great Basin; Quinn Canyon Range	Pioche/ Caselton WUI Project	Ely District, NV	11,300 acre project area; 3,246 to 4,711 acres identified for treatment. Reduce fire threat and improve wildlife habitat by thinning pinyon/juniper.	Ongoing
III	Nevada and North-eastern California	Southern Great Basin	Stonehouse WUI/ Non-WUI Project	Ely District, NV	23,676 acres project area. Reduce fire threat and improve wildlife habitat by thinning pinyon/juniper in PPH adjacent to low value habitat, affects three major GRSG leks.	Ongoing
III	Nevada and North-eastern California	Northwest Interior	Montana Mountain Fuels Project	Winnemucca District, NV	346,000 acre planning area to reduce fire threat and improve wildlife habitat.	Ongoing
III	Nevada and North-eastern California	Northwest Interior	Double H/Bilk Creek	Winnemucca District, NV	390,856 acre planning area to reduce fire threat and improve wildlife habitat.	Planning phase
III	Nevada and North-eastern California	Quinn Canyon Range	Cave/Lake Valley Watershed Plan	Ely District, NV	121,600 acres of treatments identified with interdisciplinary objectives.	Planning phase
Livestock Grazing						
III	Utah	Panguitch	Grand Staircase-Escalante National Monument Livestock Grazing Plan Amendment	Kanab Field Office, Kane County, Utah	2.1 million acre planning area to update and integrate livestock and rangeland management with the other resources in the Monument Management Plan.	Planning phase
III	Utah	All populations in UT	Fence Marking	UT	The NRCS is planning to mark fences within 3.2 miles of throughout Utah on private lands.	Ongoing
III	Utah	Parker Mountain	Coyote Hollow Grazing Assessment	Dixie National Forest, UT	Environmental analysis of the Coyote Hollow C&H Allotment.	Analysis anticipated in 2015.
Travel Management						
III	Utah	All population areas in UT	Motorized Travel Plan Implementation	UT	Implementation of motorized route designation plans across the sub-region	Ongoing

Table 5-36
Reasonably Foreseeable Future Actions in Management Zone III Likely to Impact GRSG Habitat

MZ	Sub-Region	GRSG Population Affected	Project Name	Project Location	Project Description, Estimated Footprint	Project Status
III	Utah	Sheeprocks	OHV Organized Races	Sheeprock/Tintic Mountain OHV Area	Three sanctioned motorcycle races permitted annually	Annual
Other Projects/Actions						
III	Utah	Box Elder, Ibapah, Sheeprocks	Use of Military Operating Area	West Desert, UT	Department of Defense testing and training exercises	Ongoing

This table includes a selection of some of the larger projects from the reasonably foreseeable future actions tables in the RMPs/LUPAs for MZ III. The full tables can be found in each EIS.

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Energy and Mining						
IV	Idaho and South-western Montana	Northern Great Basin	Sawtooth #4 Plan of Operation Modification	Twin Falls District, Idaho	Locatable mineral surface mining over 20 acres.	NEPA in progress.
IV	Idaho and South-western Montana	Northern Great Basin	Mineral Extraction	Dillon Field Office, Montana	Approximately 25 notices for locatable mineral extraction covering less than 50 acres.	Ongoing
IV	Idaho and South-western Montana	Northern Great Basin	Quarry Expansions	Sawtooth National Forests, Utah and Idaho	Several quarry expansions covering 40 acres total.	Planned for 2016.
IV	Idaho and South-western Montana	East Central	Dairy Syncline Phosphate Mine	Soda Springs, Idaho	Phosphate mine on estimated 580 acres (281 acres of open pit) within PGH/PHMA.	Planning phase
IV	Idaho and South-western Montana	Northern Great Basin	Oil and gas lease nominations	Rogerson-Brown's Bench, Idaho	Determine whether to offer leases on up to 90,000 acres.	Deferred, pending completion of Jarbidge RMP and GRSG EIS

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Idaho and South-western Montana	East Central	Oil and gas lease nominations	Payette-Weiser area, Idaho	Determine whether to offer oil and gas leases. Several nominations, totaling an estimated 181,000 acres.	Deferred, pending completion of Four Rivers RMP and GRSG EIS
IV	Oregon	Northern Great Basin	Malheur Queen Placer Project	North-central Malheur County, Oregon	Approximately 800 acres approved for development of placer gold extraction.	Development underway
IV	Oregon	Northern Great Basin	High Bar/Upper and Lower Pine Creek Placer Mining Project	Baker County, Oregon	Up to 250 acres of activity would be disturbed for mineral extraction.	Planning phase
IV	Nevada	Northern Great Basin	Round Mountain Gold Mine			
Expansion	Nye County, Nevada	Expansion of existing facilities at the Round Mountain Mine and development of new mining and leaching facilities at the adjacent Gold Hill ore deposit.	Planning phase			
IV	Nevada	Northern Great Basin	Angel Wing Exploration Plan	60 miles northwest of West Wendover, Nevada, on the Utah/Nevada State Line	Expansion of mining exploration activities, including construction of drill pads and access roads and existing road maintenance, from a 3.3 acre Notice to 60 acres. Access to the proposed Plan is through Utah near the town of Grouse Creek.	Planning phase

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Nevada	Northern Great Basin	Murdock Mountain Phosphate Prospecting Permit	35 miles northwest of West Wendover, Nevada, and 10 miles southwest of Montello, Nevada	Phosphate exploration drilling and trenching in the Murdock Mountain area. The operator is proposing to construct 31 drill pads with 2 drill holes per pad and 29 exploration trenches measuring 100 feet long by 5 feet wide by 5 feet deep. Exploration roads will also be constructed and existing roads will be used. Exploration operations are anticipated to take 200 days to complete.	Planning phase
Lands and Realty						
IV	Idaho and South-western Montana	Northern Great Basin; Snake-Salmon-Beaverhead	Gateway West 230/500 Transmission Line Project	Wyoming, Southern Idaho	Authorize ROW for 1,100-mile 500-kV transmission line.	Pending; Scheduled for implementation starting 2016
IV	Idaho and South-western Montana; Oregon	Baker; Northern Great Basin	Boardman to Hemingway Transmission Line Project	From Boardman, Oregon to Melba, Idaho	A proposal for an approximately 300-mile 500-kV transmission line.	Project under NEPA review.
IV	Oregon	Northern Great Basin	North Steens 230-kV Transmission Line Project	Harney County, Idaho	North Steens is a 29-mile 230-kV transmission line that would convey 104 MW of power generated from wind farms proposed on private land on the north side of Steens Mountain.	Project approved and ROD signed in December 2011; in litigation.
IV	Nevada	Northern Great Basin	China Mountain Wind Project	Northeastern Nevada	Utility-scale wind facility	Temporarily deferred pending NVCA GRSG EIS
IV	Idaho and South-western Montana	Northern Great Basin	Owyhee Land Exchange	Western Owyhee County, Idaho	Proposing to dispose of approximately 33,000 acres of non-GRSG habitat and acquiring around 38,000 acres of primarily GRSG habitat	Proposal

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Fuels and Vegetation						
IV	Idaho and South-western Montana	Northern Great Basin	Juniper Treatments in Pole Creek Allotment	Owyhee Field Office, Idaho	Juniper removal to enhance resource conditions on 24,486 acres of public, private, and state lands.	Decision issued; treatment implementation pending litigation
IV	Idaho and South-western Montana	Northern Great Basin	Juniper Treatment in Trout Springs Allotment	Owyhee Field Office, Idaho	Juniper removal to enhance resource conditions on 29,475 acres of public, private, and state lands.	Planning
IV	Idaho and South-western Montana	Northern Great Basin	Upper Castle Creek Fuels Project	Bruneau Field Office, Idaho	Juniper control project on approximately 33,000 acres. 25,000 acres implemented; anticipate 2,000-4,000 acres per year for the remaining areas.	Ongoing through 2014
IV	Idaho and South-western Montana	Northern Great Basin	Curlew Fuel Breaks and Juniper Reduction Project	Southeast Idaho	Compartmentalize the Curlew area using existing roads to improve wildfire suppression and reduce wildfire growth over 60,000 acres. Efforts will help to retain existing intact Wyoming sagebrush habitat. Remove encroaching junipers from within Wyoming sagebrush.	Planning; project implementation anticipated in 2017.
IV	Idaho and South-western Montana	Northern Great Basin	Burley Landscape Sage-Grouse Habitat Restoration	Burley Field Office, Idaho	Treat encroaching juniper on approximately 38,000 acres.	Approx. 8,500 acres already completed. Implementation of remaining 29,500 acres expected over the next 7 years

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Paradigm Project	Four Rivers Field Office, Idaho	Fuel break project that would create up to 294 miles of fuel breaks between 50 and 300 feet wide over a 10-year period. Fuel breaks would be associated with roads and other linear disturbances. At the maximum width of 300 feet, up to 10,690 acres would be directly affected. 2,111 acres of PPH/PHMA and 24,667 acres of PGH/GHMA in project area; fuel breaks would affect 61 acres of sagebrush in PPH/PHMA and 606 acres in PGH/GHMA.	Pending
IV	Idaho and South-western Montana	Northern Great Basin	South Owyhee Fuel Breaks	Boise District, Idaho	Fuel breaks over 2,000,000 acres, 850 miles.	Draft EA
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Big Desert Fuel Breaks	Idaho Falls and Twin Falls Districts, Idaho	Compartmentalize the Big Desert management area using existing roads to improve wildfire suppression and reduce wildfire growth; efforts will help to retain intact Wyoming sagebrush habitat within the northern portion of the management area. 291 miles of existing desert roads with a footprint of 10,581 acres. Upper Snake Field Office: 245 miles of roads with 8,908 footprint acres. Shoshone Field Office: 46 miles of roads with 1,673 footprint acres.	NEPA is complete and project began in 2012 within the Upper Snake Field Office; those fuel breaks identified within the Shoshone Field Office require further analysis and consultation before NEPA can be finalized.
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Big Desert Noxious Weed Treatments	Idaho Falls District, Idaho	Treating noxious weeds within the Big Desert management area over 600,000 acres. Annual treatment target of 5,000 acres.	Ongoing, began in 2006.
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Cheatgrass Treatments	Idaho Falls District, Idaho	Chemically reduce cheatgrass densities over 7,000 acres to modify fire return intervals and allow for seeded native species to become established.	Planning phase

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Salmon-Challis National Forest Forest-wide Invasive Plant Treatment EIS	Salmon-Challis National Forest	Programmatic noxious weed treatment planning within the nonwilderness portion of the Salmon-Challis National Forest (3.2 million acres)	Planning phase
IV	Idaho and South-western Montana	Northern Great Basin	Twin Falls District Noxious Weed and Invasive Plant Treatments	Twin Falls District, Idaho	Proposed action is to use prevention, prescribed fire, herbicides, and manual, mechanical, and biological methods to treat areas dominated by annual invasive species to restore perennial grasses, forbs, and shrubs. This is a programmatic planning effort. Estimated annual restoration is 5,000-10,000 acres in Burley Field Office (FO), 10,000-15,000 acres in Shoshone FO, and 10,000-15,000 acres in Jarbidge FO. Ten-year total for each office could approach 100,000 acres in Burley FO, 150,000 acres in Shoshone FO, and 150,000 acres in Jarbidge FO.	Planning phase. Implementation is planned to cover 10 years starting in 2015.
IV	Idaho and South-western Montana	Northern Great Basin	Shrub Planting	Twin Falls District, Idaho	Reintroduction of shrub species through hand planting of seedlings; up to 200,000 seedlings (13,000 acres) may be planted annually.	Implementation since 2010 and expected to continue over the next 10 years.
IV	Idaho and South-western Montana	Northern Great Basin	Twin Falls District Wildlife Tracts Restoration	Twin Falls District, Idaho	Proposed action is to use prescribed fire, chemical, drill and harrow seeding, shrub seeding, and plantings to establish perennial vegetation and restore native shrub habitat on wildlife tracts. 500-1,000 acres per year, for a cumulative total of 10,000 acres over ten years.	Implementation has been occurring since 2011 and is planned to continue over the next 8 years.

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Oregon	Northern Great Basin	Five Creeks Rangeland Restoration Project	Three Rivers and Andrews/ Steens Resource Areas, Oregon	A landscape-scale vegetation treatment encompassing approximately 73,500 acres (approximately 26,000 acres in the CMPA) to return vegetation communities to historic compositions and reduce hazardous fuel loads. Various forms of prescribed fire and mechanical treatments have been used to reduce influence of encroaching western juniper.	Ongoing
IV	Oregon	Northern Great Basin	Multiple restoration projects	Three Rivers Resource Area, Oregon	Implementation plans include thinning, piling, pile burning, and implementing a forest underburn.	Ongoing
IV	Oregon	Northern Great Basin	District-wide noxious weed treatments	Oregon	Ongoing interagency noxious weed treatment efforts with Oregon Department of Agriculture and Oregon counties.	Ongoing
IV	Oregon	Northern Great Basin	District-wide Vegetation Management (Weed EA)	Harney County, Oregon	Use new chemicals to treat noxious and invasive species.	Planning phase
IV	Oregon	Baker; Northern Great Basin	Baker Habitat Restoration and Fuels Treatment projects	Baker County, Oregon	Multi-year phased hazardous fuels and wildlife habitat restoration project on approximately 45,000 acres.	Planning phase
IV	Utah	Box Elder	Noxious weed treatments	Utah	Treating noxious weeds	Ongoing
IV	Nevada	Northern Great Basin	Santa Rosa Fuels Project	Winnemucca District, Nevada	355,699 acre planning area to reduce fire threat and improve wildlife habitat.	Ongoing
IV	Nevada	Northern Great Basin	North Tuscarora Sage-Grouse Habitat Restoration Project	Elko District Office, Nevada	Restoration of up to 10,000 acres of GRSG habitat. Treatments would improve, protect GRSG habitat, protect PPH/PHMA, protect Lahontan Cutthroat Trout Streams, improve wildlife habitat, reduce invasive weeds, and reduce hazardous fuels.	Planning phase
IV	Nevada	Northern Great Basin	Spruce Mountain Project	Elko District Office, Nevada	Spruce Mountain seeding maintenance over 700 acres. Mastication and seeding to reduce fire threat and improve wildlife habitat.	Ongoing

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Livestock Grazing						
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Grazing Permit Renewals	Challis Field Office	Renewing/modifying 2 to 5 grazing permits per year for the next ten years over 770,000 acres	Project under NEPA review.
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Range NEPA for C&H allotments	Boise National Forest, Idaho	Allotments cover over 53,000 acres.	Projects under NEPA review.
IV	Idaho and South-western Montana	Northern Great Basin	Allotment Management Plan Updates	Sawtooth National Forest, Idaho and Utah	Cattle and sheep allotment management plan updates on over 350,000 acres.	Ongoing
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Allotment Management Plan Updates	Sawtooth National Forest, Idaho	Cattle and sheep allotment management plan updates on over 140,000 acres.	Ongoing
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Grazing Allotment Management NEPA	Salmon-Challis National Forest	Grazing allotment management NEPA on over 2 million acres.	Ongoing
IV	Idaho and South-western Montana	Southwest Montana	Cessation of Lima-Tendoy Sheep Grazing	Beaverhead -Deerlodge National Forest	Permittee waiving sheep permits on 11,700 acres in PPH/PHMA back to Forest Service. Allotments will be closed to future domestic sheep grazing. No new grazing permits for any livestock will be issued for the Indian Creek Allotment. Three-year trial of 100 AUMs fall cattle grazing for Bear Canyon.	Ongoing. NEPA review and new AMP after 2015 grazing season.
IV	Nevada	Northern Great Basin	White Rock Mountain Aspen Enclosures	North-eastern Nevada	Place up to nine enclosures around aspen stands to protect from overgrazing by livestock.	Planning process
IV	Utah	Box Elder	Fence marking	Utah	The NRCS is planning to mark fences within 3.2 miles of leks throughout Utah on private lands.	Ongoing

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Wild Horses and Burros						
IV	Idaho and South-western Montana	Northern Great Basin	Wild horse gathers	Owyhee Field Office, Idaho	Gather, fertility treatment, removal of excess wild horses from HMAs. Covers 128,389 acres of public and other (private and state) land.	EAs and decisions have been approved; gathers and treatment are pending due to funding and other priority treatments within the BLM wild horse program.
IV	Oregon	Northern Great Basin	Wild horse gathers	Oregon	Gather wild horses.	Ongoing
Recreation						
IV	Idaho and South-western Montana	Northern Great Basin	Special Recreation Permits	Owyhee Field Office, Idaho	Various motorcycle, foot, and mountain bike races, horse endurance rides, dog trials, pioneer treks, and poker runs on 260,000 acres.	Ongoing
Travel Management						
IV	Idaho and South-western Montana	Northern Great Basin	Curlew/Deep Creek Travel Management Plan Implementation	Idaho Falls District, Idaho	Implement Travel Management Plan on 375,000 acres; limit motorized travel to designated routes, prohibit cross-country travel	Ongoing
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	North Highway 20 Travel Plan	Idaho Falls District, Idaho	Designate 127 miles of existing trails; construct 52 miles of new trails, construct 3 acres of parking areas, close and rehabilitate 116 miles of existing routes.	Pending
IV	Utah	Box Elder	Motorized Travel Plan Implementation	Utah	Implementation of motorized route designation plans across the planning region.	Ongoing
Land Use Planning						
IV	Idaho and South-western Montana	Northern Great Basin	Jarbridge RMP	Jarbridge Field Office, Idaho	Revise the Jarbridge RMP that provides a comprehensive plan for 1,366,000 acres that further restores or maintains resource conditions and provides for the economic needs of local communities over the long term	Ongoing

Table 5-37
Reasonably Foreseeable Future Actions in Management Zone IV Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
IV	Idaho and South-western Montana	Snake-Salmon-Beaverhead	Craters LUP Amendment	Craters of the Moon National Monument and Preserve, Idaho	Analyze a range of alternatives for livestock grazing in the Craters of the Moon covering 300,000 acres (i.e., identify lands available or unavailable for grazing, identify the amount of forage available, seasons of use, range improvements)	Ongoing

This table includes a selection of some of the larger projects from the reasonably foreseeable future actions tables in the RMPAs/LUPAs for MZ IV. The full tables can be found in each EIS.

Table 5-38
Reasonably Foreseeable Future Actions in Management Zone V Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Energy and Mining						
V	Oregon	Western Great Basin; Central Oregon	Wagon Tire Wind Energy Development Project	Harney County, OR	Develop a wind farm.	Planning phase
V	Oregon	Western Great Basin	Buckskin Mountain Wind Energy Development Project	Harney County, OR	Develop a wind farm.	Planning phase
V	Oregon	Western Great Basin	Locatable Mining	Lake, Oregon	Two areas in the Lakeview RA, where locatable mining activity is ongoing, either will continue or will expand in the near future; Tucker Hill and Rabbit Basin Sunstone areas. Tucker Hill, active 23-acres perlite mine, authorized to expand to 75 acres. Rabbit Basin Sunstone area; approximately 43 open notices and plans of operations for sunstone mines currently affecting 61 acres. Three to five new open notices received or plans of operations approved each year, for up to 25 acres of additional disturbance added each year.	Ongoing

Table 5-38
Reasonably Foreseeable Future Actions in Management Zone V Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Lands and Realty						
V	Oregon	Western Great Basin; Northern Great Basin	North Steens 230-kV Transmission Line Project	Harney County, OR	North Steens is a 29-mile 230-kV transmission line that would convey 104 MW of power generated from wind farms proposed on private land on the north side of Steens Mountain.	Project approved and ROD signed in December 2011; in litigation
V	Oregon	Western Great Basin; Central Oregon	Pacific Direct Intertie Upgrade and Maintenance	Deschutes and Lake, Oregon	Maintain and upgrade the existing Bonneville Power Administration power line from Columbia River south to the northern Nevada border.	Ongoing
V	Oregon	Central Oregon	West Butte Wind Power ROW	32 miles east of Bend, Oregon	The West Butte Wind Power ROW Project includes a permanent 4.5-mile access road, a pole-mounted 115-kV electrical transmission line, a 14.4-kV electrical utility line that would convey 104 MW of power generated from 52 wind turbines proposed on private land.	NEPA and ROD completed 2011. Implementation date unknown.
Fuels and Vegetation						
V	Nevada and North-eastern California	Western Great Basin	Vya Population Management Unit Programmatic Habitat Restoration and Fuels Reduction Project	Northeast California/ Northwest Nevada	Up to a total of 100,000 acre of treatment over a 10-year period. A combination of juniper thinning or removal and prescribed burning. 16,274 acres identified for prescribed fires and up to 83,726 acres of juniper treatment.	Planning phase
V	Nevada and North-eastern California	Western Great Basin	NE California Juniper Treatments	Northeast California/ Northwest Nevada	Multiple juniper removal treatments throughout the Alturas, Surprise and Eagle Lake Field Offices. Total 32,099 acres.	Ongoing
V	Nevada and North-eastern California	Western Great Basin	Northeast California Prescribed Fires	Northeast California/ Northwest Nevada	Multiple prescribed fire treatments throughout the Alturas, Surprise and Eagle Lake Field Offices. Burns include broadcast timber understory burns, Aspen regeneration, pile burns and small meadow broadcast burns. A total of 3,015 acres.	Ongoing

Table 5-38
Reasonably Foreseeable Future Actions in Management Zone V Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
V	Oregon	Western Great Basin	North Steens Ecosystem Restoration Project	Steens Mountain Cooperative Management and Protection Area, OR	Treat expansion western juniper on a landscape scale, encompassing approximately 336,000 acres CMPA to return vegetation communities to historic compositions and reduce hazardous fuel loads.	Ongoing
V	Oregon	Central Oregon	Vegetation Treatments	Three Rivers Resource Area, OR	A number of vegetation and fuels treatments projects to control expansion of juniper and ponderosa pine and reducing fuels.	Ongoing
V	Oregon	Western Great Basin; Northern Great Basin	Five Creeks Rangeland Restoration Project	Three Rivers and Andrews/ Steens Resource Areas, OR	A landscape-scale vegetation treatment encompassing approximately 73,500 acres (approximately 26,000 acres in the CMPA) to return vegetation communities to historic compositions and reduce hazardous fuel loads. Various forms of prescribed fire and mechanical treatments have been used to reduce influence of encroaching western juniper.	Ongoing
V	Oregon	Western Great Basin; Central Oregon	District-wide noxious weed treatments	Harney County, OR	Interagency noxious weed treatment efforts with Oregon Department of Agriculture and Harney County.	Ongoing
V	Oregon	Western Great Basin	Several ES&R Projects	Andrews Resource Area, OR	Rehabilitation following wildland fire.	Ongoing
V	Oregon	Western Great Basin	South Warner Sagebrush Sage-Grouse Habitat Restoration	Lake, OR	Juniper removal from a 50,000-acre South Warner Rim project area adjacent to the pipeline.	Ongoing
V	Oregon	Central Oregon	High Desert Shrub Steppe EA	Between Millican and Hampton, OR	Cut or burn up to 10,000 acres of juniper per year.	Ongoing
Livestock Grazing						
V	Oregon	Central Oregon	Multiple grazing permit renewals	Prineville District, OR	Renew 37 grazing permits and leases. Effects on local economy, wildlife.	Planning phase

Table 5-38
Reasonably Foreseeable Future Actions in Management Zone V Likely to Impact GRSG Habitat

MZ	Sub-region	Affected GRSG Population	Project Name	Project Location	Project Description	Project Status
Wild Horses and Burros						
V	Oregon	Western Great Basin; Central Oregon	Wild Horse Gathers	District-wide, OR	Gather wild horses.	Ongoing
Recreation						
V	Oregon	Western Great Basin	Steens Mountain Comprehensive Recreation Plan	Steens Mountain Cooperative Management and Protection Area, OR	Multiyear plan to manage recreation on Steens Mountain, including maintaining facilities, creating new facilities and trails, closing roads, and providing interpretation.	Planning phase

This table includes a selection of some of the larger projects from the reasonably foreseeable future actions tables in the RMPAs/LUPAs for MZ V. The full tables can be found in each EIS.

5.2 CUMULATIVE ANALYSIS METHODOLOGY

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment – specifically, actions that occur outside the scope and geographic area covered by the planning area. Cumulative impact analysis is limited to important issues of national, regional, or local significance.

The cumulative impact analysis tends to be broad and generalized to address potential effects that could occur from a reasonably foreseeable management scenario combined with other reasonably foreseeable activities or projects. Consequently, this assessment is primarily qualitative for most resources because of lack of detailed information that would result from project-level decisions and other activities or projects. Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the naturally occurring baseline as depicted in the affected environment (see **Chapter 3**) or the long-term sustainability of a resource or social system.

The following factors were considered in this cumulative impact assessment:

- Federal, nonfederal, and private actions.
- Potential for synergistic effects or synergistic interaction among or between effects.

- Potential for effects across political and administrative boundaries.
- Other spatial and temporal characteristics of each affected resource.
- Comparative scale of cumulative impacts across alternatives.

Temporal and spatial boundaries used in the cumulative analysis are developed on the basis of resources of concern and actions that might contribute to an impact. The baseline date for the cumulative impacts analysis is 2015. The temporal scope of this analysis is a 20-year planning horizon. Land use planning documents are generally evaluated on a 5-year cycle.

Spatial boundaries vary and are larger for resources that are mobile or migrate (e.g., migratory birds) compared with stationary resources or uses. Occasionally, spatial boundaries could be contained within the planning area boundaries or an area within the planning area. Spatial boundaries were developed to facilitate the analysis and are included under the appropriate resource section heading. The cumulative effects analysis for all topics included an analysis of cumulative effects at the planning area level. For GRSG, cumulative effects analysis included an analysis at the WAFWA Management Zones 3, 4, and 5, in addition to the planning level analysis. WAFWA Management Zones are biologically based delineations that were determined by GRSG populations and sub-populations identified within seven floristic provinces. Analysis at this level enables the decision maker to understand the impacts on GRSG at a biologically meaningful scale.

5.3 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past, present, and reasonably foreseeable future actions are considered in the analysis to identify whether and to what extent resources or resource uses have been degraded or enhanced, whether ongoing activities are causing impacts, and trends for activities in and impacts on the area. Projects and activities are evaluated on the basis of proximity, connection to the same environmental systems, potential for subsequent impacts or activity, similar impacts, the likelihood a project will occur, and whether the project is reasonably foreseeable.

Reasonably foreseeable future actions are human-generated actions that are considered against a backdrop of ongoing resource and habitat trends. The three dominant trends in the planning area that are expected to contribute most to the location and intensity of cumulative impacts are:

1. The intensifying effects of wildfire due in part to the feedback loop associated with an expanding footprint of invasive annual grasses,
2. The invasion of conifer into sagebrush habitats, and
3. Climate change.

For this broad-scale assessment, impacts associated with the three dominant trends are anticipated to far exceed any effects generated by discrete anthropogenic activities. Nonetheless, understanding the discrete impacts of localized human-generated actions is important to maintaining and restoring GRS habitat because of the potential for environmental degradation associated with these activities. Projects and activities considered in the cumulative analysis were identified through coordination with cooperators and BLM and Forest Service employees with local knowledge of the area. Each was asked to provide information on the most influential past, present, or reasonably foreseeable future actions. Additional information was obtained through discussions with agency officials and review of publicly available materials and websites.

Effects of past and present actions and activities are manifested in the current condition of the resources, as described in the affected environment (see **Chapter 3**). Reasonably foreseeable future actions are actions that have been committed to or known proposals that would take place within a 20-year planning period and would be typically reviewed during the 5-year evaluation.

Reasonably foreseeable future action scenarios are projections made to predict future impacts – they are not actual planning decisions or resource commitments. Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in factors such as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected in this analysis.

Other potential future actions have been considered and eliminated from further analysis because there is a small likelihood these actions would be pursued and implemented within the life of the plan or because so little is known about the potential action that formulating an analysis of impacts is premature. In addition, potential future actions protective of the environment have less likelihood of creating major environmental consequences alone, or in combination with this planning effort. Federal actions such as species listing would require the BLM and the Forest Service to reconsider decisions created from this action because the consultations and relative impacts might no longer be appropriate. These potential future actions may have greater capacity to affect resource uses within the planning area; however, until more information is developed, no reasonable estimation of impacts could be developed.

Data on the precise locations and overall extent of resources within the planning area are considerable, although the information varies according to resource type and locale. Furthermore, understanding of the impacts on and the interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce

potential cumulative impacts in accordance with law, regulations, and applicable LUPs.

Projects and activities identified as having the greatest likelihood to generate potential cumulative impacts when added to the Nevada and Northeastern California GRSB LUPA/EIS alternatives are displayed in **Table 5-39**.

In addition, there are on-going planning efforts both within (e.g., Carson City RMP) and adjacent to the sub-region (e.g., Idaho/ Montana Sub-Region Sage-Grouse LUPA/EIS) with which this planning effort has been coordinated and aligns. The collective actions proposed in these ongoing efforts could result in cumulative effects throughout the Great Basin Region, including on this Nevada and Northeastern California Sage-Grouse LUPA/EIS.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Central Nevada Sage-Grouse Subpopulation — Management Zone III			
Ruby 6 Vegetation Treatments	Mowing, seeding, chemical treatments to enhance sagebrush communities.	Wells Field Office, Elko District	EA being prepared.
Cedar Ridge Oil and Gas Exploration	Includes the installation of a well pad, a new access road and upgrading a portion of an existing access road for 28.6 acres of surface disturbance.	Tuscarora Field Office, Elko District	Permit application received, draft EA to be published for public comment and FONSI being developed.
Rain Mine Closure	Mine closure.	Tuscarora Field Office, Elko District	Initiating EA
Mill Canyon Exploration	Proposal for portal and twin declines, road upgrade, facilities including rapid infiltration basins in valley to support dewatering. Proposed total disturbance is 250 acres.	Tuscarora Field Office, Elko District	EA initiated.
Pinyon Range-Railroad Exploration	Exploration of 3,169 acres over 20 years.	Tuscarora Field Office, Elko District	Implementation.
Cortez Range - Goldrush	Currently an exploration project with possibility of being developed as a mine.	Battle Mountain and Elko Districts	Cortez Range – Goldrush
Phoenix Mine	Open-pit gold mining operation. Expansion of existing operations. Includes copper heap leach, mill for gold, silver and copper beneficiation. Expansion of waste rock dumps and all other facilities.	Battle Mountain District	Plan of Operation submitted.
Fire Creek Mine	Existing underground operation. Currently the project is an underground exploration operation. The project may expand.	Battle Mountain District	Plan of Operation expected.
Oil and Gas – Marys River Project	20 proposed oil wells and associated facilities.	Wells Field Office, Elko District	Four APDs have been approved and one well has been drilled and is being evaluated for production.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Lookout Mountain Mine	Open-pit gold mining operation. Operations would include one open pit, a heap leach pad, waste rock dump, tailing storage facility, and other ancillary facilities. The projected life of mine is 14 years, including construction, operations, and closure and post-closure monitoring.	Battle Mountain District	Plan of Operation expected.
Oil and Gas –Huntington Valley Project	20 proposed oil wells and associated facilities.	Tuscarora Field Office, Elko District	Six APDs have been approved and one well has been drilled and is being evaluated for production.
3 Bars Restoration Project	This project is a landscape scale, multi discipline project that is examining potential vegetation treatments across an 800,000 acre assessment are in Eureka County.	Battle Mountain District	EIS in progress.
Battle Mountain Wildland Urban Interface (WUI) EA	The goal of this project is to reduce the threat of wild fire to the community of Battle Mountain, NV.	Battle Mountain District	EA in progress.
Heath Canyon Ponderosa Hazardous Fuels EA	Hazardous fuels reduction in relic ponderosa pine and white fir stands.	Battle Mountain District	EA in progress.
Multiple existing Hazardous Fuels Projects	Project maintenance of up to 21,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources. Project includes: mastication, seeding, prescribed fire, and herbicide treatments.	Battle Mountain District	Implementation and maintenance.
Gold Bar	Expansion of the old Atlas Gold Bar Mine. This includes expanding pits and new waste rock and heap leach facilities.	Battle Mountain District	Plan submitted.
Antelope Restoration Project	Apply mechanical treatment and prescribe fire to restore vegetation condition.	Humboldt-Toiyabe National Forest, Austin-Tonopah Ranger District	Planning.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Monitor Valley-Little Fishlake, Pasco and Toiyabe Bench Pinyon-Juniper Removal	This project involves the cutting of small pinyon and juniper trees that are invading the sagebrush habitats in the eastern portions of the Toiyabe, Toquima, and Monitor mountain ranges. This project is expected to benefit GRSG and mule deer.	Humboldt-Toiyabe National Forest, Austin-Tonopah Ranger District	Planning.
Kingston	Treatment of sage-steppe vegetation for wildlife habitat improvement and fuels reduction adjacent to the community of Kingston, NV.	Humboldt-Toiyabe National Forest, Austin-Tonopah Ranger District, Kingston, NV	Planning.
Goldwedge 2014 Exploration	Proposal is for gold-silver minerals exploratory drilling at up to 49 drill sites and construction of approximately 2,800 feet of new temporary access roads, use of existing roads and overland travel on National Forest System lands, totaling approximately 3.2 acres.	Humboldt-Toiyabe National Forest, Austin-Tonopah Ranger District	Planning.
Emergency Stabilization and Rehabilitation	Priority rehabilitation of wildfire-affected GRSG habitat.	Northwestern Interior Population Nevada	Ongoing rehabilitation of GRSG habitat affected by wildfires, including sagebrush planting/seeding.
Gemfield Mine	Project is proposed to include open pit, waste rock and heap leach facility and relocating Highway 95.	Goldfield, NV. Tonopah Field Office, Battle Mountain District.	Draft EIS being developed.
Gibellini Mine	New open pit mine. This includes acid leach and ancillary facilities.	Located about 25 miles south of Eureka, NV. Mt. Lewis Field Office, Battle Mountain District	Draft EIS being developed.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Southeastern Nevada Sub-Population Area — Management Zone III			
Multiple existing Hazardous Fuels Projects	Project maintenance of up to 50,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources. Project includes: mastication, seeding, prescribed fire, and herbicide treatments.	Ely District	Implementation and maintenance.
Pioche/Casleton WUI Project	11,300 acre project area. 3,246 to 4,711 acres identified for treatment. Reduce fire threat and improve wildlife habitat by thinning pinyon and/or juniper, mastication, mowing, seeding, chaining, and cut, pile, and burn.	Ely District	Implementation, 3,157 acres completed.
Lincoln County Chain Maintenance Project	Project completed by NDOW using Nevada Department of Forestry (NDF) crews to cut trees surrounding active GRSG leks. BLM completed NEPA for the project. Maintenance of several tree chainings in Lincoln County: Woods McCulloch, Reeds Cabin, and Burnt Canyon.	Ely District	Completed. Monitoring phase.
Spruce Mountain Restoration Project	Restoration of up to 10,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources. Project includes: mastication, seeding, prescribed fire, and herbicide treatments.	Wells Field Office-Elko District	Implementation.
Kinsley Exploration Plan	Expansion of mining exploration activities, including construction of drill pads, wells and access roads. Amended Plan of Operations submitted adding 20 acres.	Wells Field Office- Elko District	Decision Record signed 2013. Decision for Amendment to be determined.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Spruce Mountain Project	Spruce Mountain seeding maintenance of 700 acres. Mastication and seeding to reduce fire threat and improve wildlife habitat	Wells Field Office- Elko District	Implementation.
Long Canyon Mine	Open-pit gold mining operation located on the east side of the Pequop Mountains. Operations would include one open pit, a heap leach pad, waste rock dump, tailing storage facility, and other ancillary facilities. A natural gas pipeline for self-power generation on site is proposed. The proposed disturbance acreage for operations is 2,116 acres, including public, private, and split-estate lands. The projected life of mine is 14 years, including construction, operations, and closure and post-closure monitoring.	Wells Field Office, Elko District	Final EIS available online. Decision expected Spring, 2015.
TransWest Express	TransWest Express is a proposed 725-mile 600kV transmission line.	Begins in south central Wyoming, crosses Utah diagonally from northeast to southwest, and crosses into Nevada and ends south of Las Vegas, NV	Final BLM ROW and Forest Service SUP anticipated in early 2016.
Zephyr Transmission line	500kV transmission line.	Begins in south central Wyoming, crosses Utah diagonally from northeast to southwest, and ends south of Las Vegas, NV	Application has been suspended until further notice.
Southwest Intertie Transmission Line	500kV transmission line.	Eastern NV from ID border to Las Vegas, NV	Portion of the line completed from Ely to Las Vegas. Northern segment is authorized but not constructed. ROW holder has requested a 5 year extension.
Southern Nevada Water Authority ROW	241 miles of 230kV, 69kV, and 25kV power lines; 306 miles of water pipeline; ancillary facilities include pump stations, and a water treatment facility.	Begins near Ely, NV and ends northeast of Las Vegas, NV	Decision signed; ROW issued.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Stonehouse WUI/Non-WUI Project	23,676 acre project area. Reduce fire threat and improve wildlife habitat by thinning pinyon and/or juniper in priority GRSG habitat adjacent to low value habitat, affects 3 major GRSG leks. Treatments includes: chaining, seeding, lop and scatter, cut and pile, mowing and drill seeding.	Ely District	Implementation; 16,660 to 19,000 acres identified for mechanical treatments; 12,359 acres treated in 2010-2012.
Pleasant Valley WUI Project	15,725 acres project area. 11,008 to 12,580 acres identified for treatment. Treatments include: mastication, chaining, broadcast burning, biomass use, hand cut, and aspen restoration.	Ely District	Implementation, 1,840 acres treated in 2010-2012.
Cold Springs Project	Implementation, 521 acres of cut, pile, and burn and 18 acres of cut and pile as of June 2013.	Ely District	Completed-In monitoring phase.
South Steptoe Watershed Plan	49,000 acres of treatments including: mastication, chaining, broadcast burning, biomass use, hand cut, and aspen restoration.	Ely District NV	BLM Decision Affirmed On Appeal.
Centennial Mine Plan	Conduct mine and exploration operations in the disturbance footprint of previously mined Mount Hamilton area on National Forest System lands and private land. There would be about 426 acres of surface disturbance on Forest Service lands	Humboldt-Toiyabe National Forest, Ely District	Decision.
Oil and Gas – Pluto Exploration Well	Reentered a previously drilled oil well to see if it can produce oil and gas. Total surface disturbance is approximately 6 acres.	Ely District	Well has been drilled and now being tested for production capabilities.
Oil and Gas – Bestoso Exploration Well	Proposed surface disturbance of 5 acres for access road and well pad.	Ely District	NEPA review for well was completed in 2012. Well is expected to be drilled by September 2016.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Ward Mtn. Watershed	This project continues thinning on the Ward Mountain Bench to protect the town of Ely, Nevada, and the surrounding developments from wildfire.	Ely District	Implementation.
Overland Pass	Hand-thinning pinyon/juniper in the Overland Pass area.	Ely District	Planning.
Combs Creek	Restore riparian areas by removing excess fuels to allow native plants to thrive and water flow rates to increase.	Ely District	Implementation.
Kious Basin/Snake Range Aspen	Kious Basin pinyon/juniper thinning project. Cooperative project with Great Basin National Park.	Ely District	Planning.
Smith Valley	Hand thinning conifer and prescribed fire pile burning.	Ely District	Implementation.
North Antelope	Treatment to improve ecological function and condition. Project includes an emergency wild horse gather and 12,000-acre conifer removal.	Ely District	An EA was completed in 2007. Implementation on-going.
Kern Mountain Stewardship Agreement	Pinyon/juniper mastication project in the Kern Mountain area.	Ely District	Identifying areas for potential 10 year stewardship contracting, NEPA in progress.
Currant/Ellison Mountain EA	Woodland removal by the use of prescribed fire and mechanical treatments.	Humboldt-Toiyabe National Forest, Ely Ranger District	Planning. 500 acres to be completed in FY15.
Ward Mountain	Reduce the Fire Regime Condition Class and reduce the threat of wildfire to City of Ely and surrounding area, and improve wildlife habitat. Using a variety of treatment methods.	Humboldt-Toiyabe National Forest, Ely Ranger District	Planning.
Green Springs Mining Exploration Project	Mineral exploration with approximately 75 acres of surface disturbance within approximately 800 acres over a period of approximately five years.	Humboldt-Toiyabe National Forest, Ely Ranger District	Implementation.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Overland Pass Habitat Restoration	Joint project with Ely BLM District to treat approximately 40,000 acres of pinyon/juniper woodlands spread across multiple jurisdictions. Objectives are to eliminate hazardous concentrations of fuels and improve sage steppe habitat.	Humboldt-Toiyabe National Forest, Ely Ranger District	Planning.
Bald Mountain Mine	Expansion of existing, authorized Bald Mountain Mine gold mine operation. Operations would include existing and new open pits, rock disposal areas, heap leach facilities, ore process areas, interpit areas, access & haul roads, growth media stockpiles, and ancillary & support facilities. The proposed new construction/operation disturbance acreage is 6,905, consisting of public lands. Projected mine life is 20 years.	Ely District	Draft EIS being developed.
Gold Rock Mine	Open-pit gold mine. Operations would include an open pit, a heap leach pad and associated ponds, process facility and refinery, a mill, a carbon-in-leach plant, waste rock dumps, a tailings storage facility, exploration, water supply wells and ancillary facilities, a six-mile transmission line, and associated maintenance road. The proposed construction/operation disturbance acreage is 3,946. Projected mine life is 48 years.	Ely District	Draft EIS published; public comment period ended 3/30/15. Decision anticipated summer/fall of 2015.
Northwestern Interior Sub-Population Area — Management Zone III			
Emergency Stabilization and Rehabilitation	Priority rehabilitation of wildfire-affected GRSG habitat.	Northwest Interior Population	Ongoing rehabilitation of GRSG habitat affected by future wildfires, including sagebrush planting/seeding.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Montana Mountain Fuels Project	346,000 acre planning area to reduce fire threat and improve wildlife habitat. This project will be a multi-year project with multiple treatments and multiple cooperators. Thus far this project includes restoration of cheatgrass die-off areas, improvement of roads (for fire access and fuelbreaks), improvement of wet meadows (fencing), mastication and seeding of decadent sagebrush stands, and creation of fuelbreaks, as well as infrastructure for the communities of Kings River and McDermitt.	Winnemucca District	Implementation.
Double H/Bilk Creek	390,856-acre planning area to reduce fire threat and improve wildlife habitat Fuel Reduction and Rangeland Health	Winnemucca District	Planning.
Coeur-Rochester Mine	Expansion of operations at the existing Coeur Rochester Mine, which is located in the Humboldt Range, Pershing County, Nevada.	Winnemucca District, approximately 18 miles northeast of Lovelock, NV.	Draft EIS being developed.
Hycroft Mine	Plan modification for the addition of a tailings pond to accommodate the proposed and permitted mill.	Winnemucca District	Baseline data being developed. EIS initiated.
Quinn Range Sub-Population Area — Management Zone III			
Lincoln County Chain Maintenance Project	Project completed by NDOW using NDF crews to cut trees surrounding active GRSG leks. BLM completed NEPA for the project. Maintenance of several tree chainings in Lincoln County: Woods McCulloch, Reeds Cabin, and Burnt Canyon.	Ely District	Completed. In monitoring phase.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Pioche/Caselton WUI Project	11,300 acre project area, 3,246 to 4,711 acres identified for treatment. Reduce fire threat and improve wildlife habitat by thinning pinyon and/or juniper, mastication, mowing, seeding, chaining, and cut, pile, and burn.	Ely District	Implementation. 3,157 acres completed.
Cave/Lake Valley Watershed Plan	121,600 acres of treatments identified. Project is set-up for the Cave and Lake Valley Watershed Treatments Plan Environmental Assessment. Treatments includes: chaining, seeding, lop and scatter, cut and pile, mowing and drill seeding.	Ely District	Planning.

North Central Nevada/Southeastern Oregon Sub-Population Area — Management Zone IV

Double H/Bilk Creek	390,856 acre planning area to reduce fire threat, improve wildlife habitat and rangeland health.	Winnemucca District	Planning.
Montana Mountain Fuels Project	346,000 acre planning area to reduce fire threat and improve wildlife habitat. This project entails the creation of a fuels management plan. It will be a multi-year project with multiple treatments and multiple cooperators. Thus far this project includes restoration of cheatgrass die-off areas, improvement of roads (for fire access and fuelbreaks), improvement of wet meadows (fencing), mastication and seeding of decadent sagebrush stands, and creation of fuelbreaks as well as infrastructure for the communities of Kings River and McDermitt.	Winnemucca District	Implementation.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Santa Rosa Fuels Project	Ongoing 355,699-acre planning area to reduce fire threat and improve wildlife habitat. The Santa Rosa project is a landscape scale project designed to restore and protect important wildlife habitat, sensitive species habitat for GRSB and pygmy rabbit, streams containing Lahontan Cutthroat Trout, a federally listed threatened trout species, and areas within watersheds on public lands administered by BLM and the US Forest Service.	Winnemucca District	Implementation.
Multiple existing Hazardous Fuels Projects	Project maintenance of up to 16,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources. Project includes: mastication, seeding, prescribed fire, and herbicide treatments.	Winnemucca District	Implementation and maintenance.
Northeastern Nevada Sub-Population Area — Management Zone IV			
Hazardous fuels reductions and fuels maintenance projects	Hazardous fuels reduction and maintenance projects.	Owyhee, Squaw Valley, 25, SANE group allotments; Elko and Wells Field Offices	Implementation.
Multiple Hazardous Fuels Projects	Project maintenance of up to 9,000 acres to improve wildlife habitat, reduce hazardous fuels, improve forest health, and protect cultural resources. Project includes: mastication, seeding, prescribed fire, and herbicide treatments.	Elko District	Implementation and maintenance.
Big Ledge Barite Mine Amended	Mine closure.	Wells Field Office, Elko, District	Plan submitted.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Murdock Mountain Phosphate Prospecting Permit	Phosphate exploration drilling and trenching in the Murdock Mountain area. The operator is proposing to construct 31 drill pads with 2 drill holes per pad and 29 exploration trenches measuring 100 feet long by 5 feet wide by 5 feet deep. Exploration roads will also be constructed and existing roads will be used. Exploration operations are anticipated to take 200 days to complete.	35 miles northwest of West Wendover, Nevada	Project deferred pending EIS decision.
North Tuscarora Sage-Grouse Habitat Restoration Project	Restoration of up to 10,000 acres of GRSg habitat. Treatments would improve, protect GRSg habitat, protect Lahontan Cutthroat Trout, improve wildlife habitat, reduce invasive weeds, and reduce hazardous fuels.	Tuscarora Field Office-Elko District	Implementation.
Sage Grouse Habitat Mitigation Arturo Mine	Off-site habitat restoration of approximately 1,616 acres.	Tuscarora Field Office- Elko District	Early stages of implementation.
Hollister Mine	Underground mine and power lines. 222 acres disturbance permitted.	Tuscarora Field Office- Elko District	Record of Decision signed March 1, 2014; project approved.
Arturo Mine	Open pit expansion. 2774 acres permitted disturbance.	Tuscarora Field Office- Elko District	Record of Decision signed in 2014.
Big Bird Mine	Proposed barite mine, approximately 200 acres proposed disturbance.	Tuscarora Field Office- Elko District	Baseline stage. POO not submitted.
Midas Vent Raises	Ventilation for underground mine & power lines.	Tuscarora Field Office- Elko District	DR and Plan approval signed May 2013
Heavy Spar Mine	Barite mine, approximately 280 acres proposed disturbance.	Tuscarora Field Office- Elko District	Baseline stage. POO not submitted.
Midas Tails	Mine expansion, approximately 100 acres proposed disturbance.	Tuscarora Field Office- Elko District	Baseline stage. No POO yet.
China Mountain Wind Project	Utility-scale wind facility.	Northeastern Nevada	Temporarily deferred pending NV/CA GRSg LUPA/EIS.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
White Rock Mountain Aspen Enclosures	Place up to nine enclosures around aspen stands to protect from overgrazing by livestock.	Northeastern Nevada	Undergoing NEPA/archaeological review.
Southwest Intertie Transmission Line	500-kilovolt alternating current transmission line.	Idaho and southern Nevada, eastern Nevada	Portion of line completed from Ely to Las Vegas. Northern segment authorized but not constructed. ROW holder has requested a 5-year extension.
Eureka Pipeline Project	Natural gas pipeline from Goldstrike to Gold Quarry.	Elko District	2014 ROW issued; Decision Record signed.
Rossi Mine Expansion	Existing barite mine in operation since 1947. Currently permitted 912 acres. Proposal to expand to 3,731 acres.	Located approximately 50 miles northeast of Battle Mountain, Nevada-Elko District	Plan of Operation submitted. Plan under review.
Oil and Gas Lease Sale	Lease sale.	Elko District	March 8, 2016 competitive auction of lease parcels.
Tuscarora Geothermal Plant Expansion	Geothermal development.	Elko District	EA being prepared.
Coyote Project	Barite removal.	Elko District	EA being prepared.
Elko Area Expansion Project	35-mile 8-inch diameter natural gas pipeline primarily parallel to SR Hwy 225. Estimate of less than 400 acres of disturbance.	Ruby Pipeline Compressor Station to Elko Lateral, near Elko, Nevada	Planned for May 2015 to in-service by November 2015. Recommended avoidance and minimization action initiated. Mitigation pending.
North Elko Pipeline Project	Natural gas pipeline; Spring 2014: Approved mitigation action to install 32,559 sagebrush plants on 167 acres.	Elko District near Tuscarora, Nevada	Implemented. Augments 39,749 sagebrush and 1600 bitterbrush plants installed on approximately 198 acres as part of mitigation actions during Spring 2013.
Ormat Tuscarora Geothermal Project	Geothermal plant. Voluntary mitigation funds via Tuscarora Geothermal Project Cooperative Agreement for Sage-Grouse Conservation and Habitat Improvement.	Elko District near Tuscarora, Nevada	Implemented; Initiate expenditure of \$622,500.00 in voluntary mitigation account for conservation of GRSG habitat.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Ruby Pipeline Project	Voluntary GRSB mitigation funds.	Elko District	Ongoing expenditure of \$3,071,218.00 in voluntary mitigation account on Elko District for conservation of GRSB habitat.
Fence Modifications and Wildlife Protection Devices	Installation of GRSB flight diverters on livestock control fencing. Installation of approximately 60,000 diverters on approximately 63-miles of fence.	Elko District	Categorical Exclusion. Ongoing.
Emergency Stabilization and Rehabilitation	Priority rehabilitation of wildfire-affected GRSB habitat.	Elko District	Ongoing rehabilitation of GRSB habitat affected by wildfires, including sagebrush planting/seeding.
Barrick Goldstrike Betze Pit	GRSB mitigation.	Elko District	Ongoing expenditure of approximately \$26,704.00 remaining in \$100,000.00 voluntary mitigation account on Elko District for conservation of GRSB habitat.
Big Springs Gold Mine Project	The exploration project proposes approximately 60 drill holes spread between 16 individual drill sites within previously disturbed areas of the former Big Springs Mine site.	Mountain City Ranger District	Planning.
Black Jack Project	Exploration drilling. Three drill pads.	Mountain City Ranger District	Planning.
Quantum Jarbidge Exploration	Quantum Minerals proposes to drill approximately 40 exploration drill holes from 10-12 drill sites, construct approximately 4000 feet of new road and excavate up to 500 feet of exploration trenching for a total of approximately 3 acres of disturbance	Jarbidge Ranger District	Planning.

Table 5-39

Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation

Name of Action	Description of Action	Location	Status of Action
Northeastern California/Northwest Nevada Sub-Population Area — Management Zone V			
Vya Population Management Unit Programmatic Habitat Restoration and Fuels Reduction Project	Up to a total of 100,000 acre of treatment over a 10-year period. A combination of juniper thinning or removal and prescribed burning. 16,274 acres identified for prescribed fires and up to 83,726 acres of juniper treatment.	Surprise Field Office	Record of Decision signed August 21, 2013. Implementation.
Virginia Mountain Project	10-15 year juniper reduction project: mastication, thinning, lop and scatter and post fire restoration.	Carson City District	EA in progress.
Northeastern California Juniper Treatments	Multiple juniper removal treatments over a total of 32,099 acres.	Alturas, Surprise and Eagle Lake Field Offices	Implementation.
Northeastern California Prescribed Fires	Multiple prescribed fire treatments throughout the Alturas, Surprise and Eagle Lake Field Offices. Burns include broadcast timber understory burns, Aspen regeneration, pile burns and small meadow broadcast burns. A total of 3,015 acres.	Alturas, Surprise and Eagle Lake Field Offices	Implementation.
Lands and Realty Cases within the BLM LR2000 System — All Management Zones			
Other LUAs	795 pending cases.	Within the sub-region	Applications pending and under NEPA review.
ROW- Wind Testing	5 pending ROW cases for testing.	Within the sub-region	Applications pending and under NEPA review.
ROW- Wind Development	4 pending ROW cases for development.	Within the sub-region	Applications pending and under NEPA review.
Land Tenure actions - disposals	3,435,300 acres are identified for disposal.	Within the sub-region	Some applications are pending, other lands are identified.
Locatable Plans of Operation	98 Pending Plans of Operation.	Within the sub-region	Applications pending.
Locatable Notices of Exploration	105 Pending Notices of Exploration.	Within the sub-region	Applications pending.

Table 5-39**Reasonably Foreseeable Future Actions by WAFWA Management Zones and Greater Sage-Grouse Population/Subpopulation**

Name of Action	Description of Action	Location	Status of Action
Mineral Material sites	81 Pending cases.	Within the sub-region	Applications pending.
Other Sub-Regional Actions			
Carson Lake Geothermal Utilization Project – Ormat	40-MW power plant.	15 miles southeast of Fallon- MZ III	Construction not initiated.
New York Canyon Geothermal	62-MW power plant.	Pershing County, Nevada	NEPA finalized; construction not initiated.
Ongoing vegetation management actions	Noxious and invasive weed control, post fire rehabilitation seedings, and range improvement seedings.	Across entire sub-region and all Populations	Implementation.
Salt Wells Geothermal Utilization Project	120-MW power plant.	15 miles southeast of Fallon- MZ III	Construction not initiated.
Dixie Hope Geothermal Utilization Project	38.5-MW geothermal energy plant and associated infrastructure, including power line (from site to Jersey Valley power plant) and well fields; a phase II power plant may be constructed if geothermal resources are sufficient.	Dixie Valley	Utilization Plan received, under review.
Tungsten Geothermal Utilization Project	20-MW Geothermal energy plant and associated infrastructure, including power line and well fields.	Carson City District - Edwards Creek Valley	EA in progress.
Wild Rose II Geothermal Utilization Project	35-MW geothermal energy plant to be built in same area as existing power plant.	Carson City District - Gabbs Valley	One power plant constructed, and the second power plant is under construction.
Luning Solar Energy Project	50-MW photovoltaic solar generation facility on approximately 560 acres of public lands, associated infrastructure and a 120-kV gen-tie line.	Carson City District - Mineral County, NV near town of Luning	EA in progress
Enel Salt Wells Solar Project	Proposed 19-MW photovoltaic solar generation facility north of existing Geothermal power plant.	Carson City District - ~20 miles southeast of Fallon, NV	EA in progress

5.4 VEGETATION

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect vegetation and soils resources are locatable and fluid mineral development, lands and realty actions, livestock grazing and range improvements, vegetation management, wildfires, invasive plant species, drought, and climate change.

The combination of all of these actions would likely cause an increased chance of the spread and establishment of invasive weeds. Drought conditions, combined with wildfires and invasive species presence and potential climate change effects could lead to increased invasive annual vegetation and increase the frequency of wildfires, causing a cyclic effect, compounding the vegetation loss and conversion to invasive annual grass communities. The Central Basin and Range REA provides a risk potential of invasive annual grass cover due to a combination of factors, such as proximity to past wildfires, wildfire history, and other criteria. The REA data shows that much of the central Great Basin is at risk of invasive annual grass presence. Also, the potential for soil erosion could increase as invasive weed populations crowd out the native vegetation and its soil holding characteristics. Post-fire vegetation treatments and other restoration projects designed to bring damaged sites to healthy functioning systems, combined with mitigation measures from the above mentioned actions and invasive weed control treatments may offset vegetation and soil disturbances.

Sagebrush is killed by wildfires and recovery requires many years, especially in the case of large fires. Contiguous old-growth sagebrush sites are at high fire risk, as are large blocks of continuous dead sagebrush. Prior to recovery, these sites are of limited use by GRSG except along the edges in unburned islands. As a result of this loss of habitat, fire has been identified as a primary factor associated with GRSG population declines. Depending on the species and the size of a burn, a return to a full pre-burn community cover can take 13 to 100 years (Connelly et al. 2004). In addition, fires can result in a reduction of invertebrate food sources and may facilitate the spread of invasive weeds. Cheatgrass readily invades sagebrush communities especially in drier, lower elevation areas, and disturbed sites after wildfire (Balch et al. 2012). Cheatgrass changes historical fire patterns by providing an abundant, continuous and easily ignitable fuel source that facilitates rapid fire spread. While most sagebrush subspecies are killed by fire and are slow to reestablish, cheatgrass recovers within one to two years of a fire event from seed in the soil.

Invasive weeds alter plant community structure and composition, productivity, nutrient cycling, and hydrology and may cause declines in native plant populations, including sagebrush habitat, through competitive exclusion and niche displacement, among other mechanisms. Invasive plants reduce and, in cases where monocultures occur, eliminate vegetation that GRSG use for food

and cover. Invasive plant species do not provide suitable GRSG habitat, since the species depends on a variety of native forbs and the insects associated with them for chick survival. GRSG also depend on sagebrush, which is eaten year-round and used exclusively throughout the winter for food and cover. Along with competitively excluding vegetation essential to GRSG, invasive weeds fragment existing GRSG habitat or reduce habitat quality. Invasive annual grasses can also create long-term changes in ecosystem processes, such as more frequent and severe fire-cycles and other disturbance regimes that persist even after an invasive plant is removed (Connelly et al. 2004, pp. 5-9).

All the management areas in the planning area are threatened to some extent by the spread of invasive weeds (especially cheatgrass). Beyond managing risk, restoration of potentially valuable areas, such as those that would increase connectivity among seasonal habitats or sub-populations, or increase quality of current seasonal ranges, may become an important management option where natural and anthropogenic patterns and processes have fragmented and degraded habitats (Manier et al. 2013).

Alternatives Analysis

Under Alternative A, grazing by livestock and wild horses and burros would continue under current policies and regulations, resulting in both improved and degraded vegetation conditions. Vegetation would continue to be affected by wildfire and subsequent post fire treatments. Recreational vehicle use could spread invasive plant seeds causing introduction of new populations. Continued vegetation treatments would reduce conifers in GRSG habitat.

Because Alternatives B, C, D, E, F, and the Proposed Plan reduce the potential for cumulative impacts on vegetation, to varying degrees, from livestock grazing, locatable and fluid mineral development, and lands and realty actions, those Alternatives may help to reduce vegetation and soil disturbance on a landscape scale.

Alternative C, in general, includes passive restoration rather than active vegetation manipulation. Although vegetation conditions are likely to improve, the benefit to vegetation resources would be realized over a longer time scale compared to Alternative A.

Increased vegetation treatments under Alternatives B and D, combined with those that are ongoing or planned, may cause more surface disturbance on a short-term scale, but the treatments would benefit GRSG habitat, improve vegetation health, and promote resiliency and resistance to invasive plant encroachment over a longer time period. The combination of past, present, and future active treatments carried out over an extended period of time would reduce invasive plant populations.

Under Alternative E in Nevada, the Nevada Conservation Credit System could provide more sagebrush/perennial grass vegetation and/or limit further disturbance in GRSG habitat.

Restrictions on surface disturbances under Alternative F, such as reduced livestock use combined with reduced wild horse AML levels and other actions would lead to improved vegetation conditions. Proposed restoration in sagebrush communities, combined with past, present, and planned restoration activities would also lead to improved sagebrush stands in GRSG habitat.

Under the Proposed Plan, specific management actions and applicable RDFs intended to enhance sagebrush/perennial grass vegetation, along with reduced disturbance, restricted allocations for resource use, prioritization of fire and fuels treatments, establishment of SFA and resulting prioritization within them, adaptive management and GRSG habitat objectives would be expected to result in sagebrush/perennial grass communities showing improved health, vigor, resilience to disturbance and resistance to invasive plants throughout the planning area. Past, present, and planning active treatments combined with management actions under the Proposed Plan would be expected to reduce the invasive plant population over time.

5.5 SOIL RESOURCES

The cumulative impact analysis area used to analyze cumulative impacts on soils includes the entire planning area. Surface-disturbing activities occurring within the planning area are not expected to affect soil resources outside of the planning area. The cumulative impact analysis area used to analyze cumulative impacts on water quality and watershed resources extends outside of the planning area, following fourth-order watershed boundaries. Given that the hydrologic influence of the surrounding area is primarily focused in the stream channels and that delineation of the cumulative impact analysis area was based on watershed boundaries, the area of analysis is sufficient. The hydrologic influence of the planning area on areas outside the planning area is primarily the result of hydrograph alteration and quality of the water flowing from the area. Areas extending beyond the planning area may be considered for cumulative impact analysis where the hydrologic unit extends outside the planning area.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect soil and water resources are mineral development, livestock grazing, infrastructure development, vegetation treatments, wildfires, recreation, and travel and transportation activities.

Alternatives Analysis

Mineral development, including oil and gas, coal, and other minerals, could cause localized impacts on soils. Intensive mechanical vegetation treatments likely have and would continue to impact soils resources locally, but they would increase vegetation cover, and thus soil health, over the long term. Past livestock grazing

has impacted soil resources. Active management of grazing allotments has led to improvements in soil health over time in the planning area.

An important trend in the planning area is rapidly increasing recreational use. This growth in recreation on public lands is due to local population growth, as well as the planning area's reputation as a national and international recreation destination. All forms of recreational activities can increase potential for erosion, sedimentation, gully creation, biologic soil crust damage, and riparian and upland vegetation damage. Recreation activities may also directly and indirectly impact water quality due to erosion and sediment production potential. However, the significance of such impacts varies with the nature and degree of disturbance as well as site specific environmental conditions. Typically larger disturbances represent greater potential to damage soils and vegetation, degrade water quality, and impair overall watershed function and condition compared to smaller disturbances.

Potential cumulative impacts on water resources would be reduced under Alternatives B, C, D, E, F, and the Proposed Plan due to the reduced potential for activities that would alter functional vegetative communities and lead to increased runoff and sediment/contaminant delivery. Activities with impacts on water resources include management actions attributed to the alteration of natural vegetative communities (e.g., pinyon and/or juniper encroachment and cheatgrass), historic grazing practices, surface-disturbing actions in areas of low reclamation potential, conversion of native rangelands to irrigated agricultural lands (on non-BLM-administered and National Forest System lands), improper maintenance of transportation facilities, spills/leaks of substances used to develop mineral resources, and recreational use. These activities cause surface disturbances by removing vegetation cover, displacing and compacting soils, and altering soil structure and chemistry. The result is exposed surfaces that increase the potential for runoff and erosion, which delivers sediment and contaminants to nearby waterways. Anthropogenic disturbances would be least likely to result in cumulative effects on soil resources under Alternatives B, C, and F. Alternative C would remove any potential for disturbance in GRSG habitat associated with livestock grazing, but could result in degraded soil conditions due to a passive management approach that could promote intense wildfires. Alternatives D and the Proposed Plan would provide lesser protections from anthropogenic disturbances and livestock grazing, but would decrease the likelihood for long-term cumulative effects on soil associated with wildfire.

The cumulative effect of past, present, and reasonably foreseeable future mineral development, invasive species, wildfires, livestock grazing and other ground-disturbing activities could damage biological soil crusts.

5.6 RIPARIAN AREAS AND WETLANDS

The cumulative impact analysis area for impacts from proposed management actions on riparian areas and wetlands includes all GRSG habitats on public and private lands within the sub-region. Effects of alternatives are analyzed over the short term (two years) and over the long term (20 years).

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected or would (in the future) affect riparian areas and wetlands include: leasable, salable, and locatable minerals management; travel management; lands and realty actions; energy development; livestock grazing; wild horse and burro management; vegetation management; wildlife management; recreation management; special use designations; and climate change.

The effects analysis is based on information characterizing current habitat conditions (refer to 3.4 Riparian Areas and Wetlands, Current Conditions) and on general assumptions of how various kinds of land uses or conditions can affect riparian areas and wetlands based on a review of the literature (refer to 4.6 Riparian Areas and Wetlands, 4.6.2 Nature and Types of Effects). Typical direct and indirect negative short and long-term effects from ground-disturbing activities include compaction and loss of infiltration, increased runoff, accelerated erosion, increased infestations of invasive plants and shifts in plant communities from more mesic species to species associated with drier conditions. Where lands are protected through special use designations or where prescriptive management actions are applied (such as a livestock grazing system), direct and indirect effects on riparian areas can be positive, especially over the long term. Project design features and mitigation programs that focus on habitat enhancement can also reduce adverse impacts and/or create positive short and long-term effects. In the case of climate change, effects of a hotter, drier environment on riparian habitats would result in decreased water supplies and increases in evaporation rates. Over the long term, both the extent and viability of riparian plant communities would likely decline.

The following analysis examines relative differences among alternatives in terms of adding incremental effects on the effects of past, present, and reasonably foreseeable actions and conditions on riparian areas and wetlands within the planning area. It is generally assumed that all alternatives, with the exception of alternative A, add incremental positive direct and indirect short and long-term cumulative effects on riparian areas and wetlands. Alternatives B, C, E and F, as well as the Proposed Plan all contain at least some actions designed to reduce disturbance and/or to enhance or restore upland and riparian habitats. In some cases, components of alternatives have the potential to add incremental adverse indirect impacts (these situations are discussed in the following sections).

5.6.1 **Alternative A**

Disturbance to riparian areas and wetlands is expected to accelerate throughout within the planning area. Under Alternative A, the vast majority of the planning area is open to surface-disturbing activities associated with mineral and energy development. Numerous projects or activities which could adversely impact riparian habitats are foreseeable across the planning area and would add negative direct and indirect and short and long-term cumulative impacts. Some of these impacts would be offset or reduced as result of stipulations or other measures incorporated into the permitting process.

Land uses such as grazing by livestock and wild horses and burros would continue under current policies and regulations. The nature and type of cumulative impacts would depend on the effectiveness of management applications. Where grazing by livestock and/or wild horses and burros exceeds the ability of riparian areas to recover over the long-term, cumulative impacts would be negative. Riparian areas and wetlands will continue to be affected by trampling, soil compaction and loss of vegetative cover. Where prescriptive or managed grazing practices are applied or where wild horses and burros are at or below AML, cumulative impacts would be positive. Reduced levels of grazing or changes in timing of grazing impacts would allow degraded areas to recover.

Recreational use of public lands within the planning area is expected to increase causing additional adverse incremental impacts on riparian areas and wetlands primarily in the form of increased trampling and compaction of wetland soils and of riparian plant. Increases in both vehicular and foot traffic into riparian habitats would also increase opportunities for the spread of invasive weeds.

Numerous vegetation treatments including projects designed to improve wildlife habitat as well as overall rangeland health have or would be implemented within PHMA and GHMA within the planning area (refer to **Table 5-39**). Collectively, these projects, which cover many thousands of acres, could directly and indirectly add positive long-term cumulative effects on riparian areas by promoting overall watershed health leading to increased infiltration rates, decreased erosion, and improved resiliency against fires and invasive plants.

5.6.2 **Alternative B**

Alternative B adds positive cumulative effects on riparian areas and wetlands by reducing surface-disturbing activities associated with mining, travel, recreation, energy development, and lands actions in GRSG habitat. Fewer acres of riparian areas and wetlands would be directly or indirectly impacted by soil compaction, accelerated erosion and loss of plant cover compared to Alternative A.

Proposals to emphasize managing livestock grazing and wild horses and burros for improved ecological conditions in GRSG summer brood-rearing habitat would also add positive cumulative effects on riparian areas. Compared to Alternative A, more acres of riparian areas would improve where grazing practices and wild horse numbers were managed for vegetative recovery.

However, added restrictions on land uses have the potential to create indirect adverse incremental effects on riparian habitats if tools for better livestock distribution are less available and if certain vegetative treatments for fuels or watershed health are not implemented. Limitations on water developments in GRSG habitats could cause livestock to become further concentrated on water sources in riparian areas, while reductions in upland vegetative treatments could contribute to a decline in overall watershed health.

5.6.3 Alternative C

Compared to Alternative A, Alternative C adds substantial positive direct and indirect cumulative effects on riparian areas and wetlands within PHMA and GHMA. Widespread reductions or eliminations in surface-disturbing activities and in livestock grazing would allow for degraded areas to recover naturally and, in many cases, rapidly. Impacts would persist over the long term.

However, reduced opportunities for collaborative watershed management and for use of tools such as targeted livestock grazing and/or fuels treatments have the potential to add incremental indirect adverse effects. Interest in cooperative restoration of intermingled private riparian and wetland habitats would likely decline, while fire starts affecting riparian habitats could increase over time.

5.6.4 Alternative D

Cumulative impacts on riparian areas and wetlands under Alternative D would be similar to Alternative B with the exception that there would be more opportunities for surface disturbance. Consequently, incremental benefits of reduced disturbance on riparian areas under Alternative D are greater compared to Alternative A but less than compared to Alternative B.

Under Alternative D, incorporation of fallback standards (use restrictions) into the livestock grazing planning process would add more positive impacts on riparian areas in comparison to both Alternatives A and B. Where grazing practices preclude attainment of rangeland health standards, use restrictions would add additional protections to riparian and wetland habitats.

Additional emphasis on collaborative management and on habitat restoration proposed under Alternative D adds additional positive cumulative impacts compared to Alternative A. Collaborative management has the potential to improve riparian habitats at the landscape level and across jurisdictional boundaries, while active restoration has the potential to accelerate recovery of habitats damaged by conditions such as fire or invasive plants infestations.

5.6.5 Alternative E

Compared to Alternative A, Alternative E provides more opportunity for positive cumulative effects on riparian habitats within GRSG habitat in Nevada. If successful, strategies proposed under Alternative E to avoid, minimize, or mitigate impacts on riparian areas and wetlands would both reduce ground disturbance in and around riparian habitats and increase enhancement of

riparian areas through collaboration and through application of the Conservation Credit System. The emphasis on management across jurisdictional boundaries has the potential to improve many more acres of riparian habitats on private lands. In addition, by incentivizing conservation, industry is more likely to advocate for riparian restoration.

Components of Alternative E which reduce certainly for effectiveness of management actions (refer to discussion under Riparian Areas and Wetlands, Alternative E, **Section 4.6.8**) also reduce certainty that cumulative impacts are relatively more positive for riparian areas compared to Alternative A.

5.6.6 Alternative F

Actions proposed under Alternative F add more positive cumulative impacts on riparian areas and wetlands compared to Alternative A. Reduced surface disturbance and incorporation of restrictions on livestock and wild horse and burro use would add incremental beneficial effect on riparian habitats. Surface disturbing activities as well as use of riparian areas by livestock and wild horses and burros have the potential to promote accelerated erosion, soil compaction and alteration of riparian plant communities. Reductions in these activities would contribute to the recovery of degraded habitats.

Implementation of sagebrush restoration and enhancement strategies would improve overall watershed health directly and indirectly benefit riparian habitats by decreasing erosion rates, increasing infiltration and building resiliency against such threats as fire, invasive weeds and climatic events.

As with Alternative C, restrictions in livestock use across the planning area could add incremental adverse indirect effects if opportunities for collaborative watershed management are reduced. Many key riparian habitats for GRSG occur on intermingled or adjacent private lands.

5.6.7 Proposed Plan

Comprehensive strategies and actions designed to better manage GRSG habitat at a landscape level and to ameliorate the effects of anthropogenic disturbance would add more positive cumulative effects on riparian areas and wetlands throughout the planning area compared to Alternative A. Riparian areas and wetlands would benefit from increased collaboration with stakeholders, application of RDFs, establishment of GRSG screening criteria, increased focus on GRSG habitat needs as part of management and planning decisions, ecologically based restoration, more comprehensive fire and fuels management, implementation of adaptive management, and development of innovative strategies to incentivize conservation and to better track and monitor results would collectively improve resiliency and ecological health of riparian areas over the long term. There would be less direct disturbance to riparian areas and surrounding uplands, while targeted management actions would restore and enhance GRSG habitat at a watershed scale. In addition, use of the Conservation Credit System would focus added restoration and enhancement activities on

riparian habitats. Because riparian areas are so important for brood rearing within the planning area and because these areas are so responsive to changes in management, it is assumed riparian and wetland sites on both public and private lands would be targeted for offsite mitigation.

5.7 WILD HORSES AND BURROS

The cumulative impact analysis area used to analyze cumulative impacts on wild horse and burro management includes the planning area because impacts are expected to be limited to those actions originating within the planning area. Under all alternatives, wild horse and burro management would be directed to achieve and maintain AMLs, achievement of Thriving Natural Ecological Balance (TNEB), and preservation of GRSG habitat. Additionally, with the exception of Alternative F, management actions for wild horses and burros would not result in direct changes to HMA/WHBT designation, to AMLs within designated HMAs/WHBTs, or acreage designated as HMAs/WHBTs. Resource management actions (e.g., vegetation treatment, livestock grazing, fuels, leasing limitations and closures, and travel restrictions, etc.) that conserve, enhance, or restore GRSG habitat would also benefit wild horses and burros. Management actions which reduce access to or the availability of water and/or forage or restrict movement could result in the potential need for reduction of the wild horse and burro AML within an HMA/WHBT. Cumulative impacts under all alternatives, with the exception of Alternative F, would be limited to any future changes that may result in potential adjustments, both positive and/or negative, to the AML, acreage adjustments and reconsideration of HMA/WHBT designation that are based on achievement of GRSG habitat objectives for improving habitat conditions.

Under Alternative F, in order to achieve GRSG habitat objectives and reduce utilization levels and other impacts associated with wild horses and burros, all AMLs of the established HMAs/WHBTs within GRSG habitat would be reduced by 25 percent. Cumulatively, reductions to this level could impact herd sustainability and diversity, which could lead to changes in HMA/WHBT designation and long-term management in GRSG habitat.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area, both within and outside GRSG habitat, that have affected and would likely continue to affect wild horse and burro management are actions or external factors (e.g., climate change) that change forage and water availability, access to water and forage sources, range condition, barriers to movement, and population control activities (removal of excess animals, population growth suppression, etc.). Future actions pertaining to such activities as recreational events and development for minerals, energy, and transmission lines that are pushed outside of GRSG habitat areas may result in increased indirect disturbance to wild horses and burros in those areas.

5.8 WILDLAND FIRE AND FIRE MANAGEMENT

The cumulative impact analysis area used to analyze impacts on Wildland Fire Management is equivalent to the planning area but also similar to the activities and trends in adjacent planning areas.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect wildland fire management include: leaseable, salable and locatable mineral management; travel management; lands and realty actions; renewable energy development; livestock grazing; wild horse and burros management; vegetation management; recreation management; and climate change.

Wildland Fire Management

Cumulative impacts on wildland fire management reduces the BLM's and Forest Service's ability to respond to uncharacteristic wildland fires. Increases in human caused ignitions risks and fuel loading along with changes in fire behavior and weather conditions alters and intensifies the frequency of nonnative invasive species and species associated with drier fuel conditions. The nature and type of cumulative impacts depend on such variables as management strategies, mitigation programs, project design features, FRCC trends, climate patterns, and other factors.

From 1982 to the present, minerals, lands and realty, and renewable energy developments have impacted fire ecology and management as more areas have been developed, thereby increasing the spatial scope and overall demand for fire suppression to protect buildings and infrastructure. At the same time, energy and mineral development, particularly surface-disturbing activities, have contributed to human-caused ignitions in the past and would do so in the future. The development and expansion of wildland urban interface areas, recreation activities, and OHV use have also increased the potential for human caused fire.

ROWs and associated development may increase the risk of human-caused ignitions due to vehicular travel to and from the site, construction, maintenance, and operation of the facilities. Linear ROWs provide fuels breaks and may decrease the risk of wildfire spread. The development allowed under these authorizations would result in surface disturbance, which would generally contribute to the modification of the composition and structure of vegetation communities in the vicinity of developed areas, which could then be more likely to fuel high intensity fires.

Livestock grazing and wild horse and burro management could reduce the fire risk in the short term but in the long term, without proper management, invasive nonnative species would increase. Any increase in fine fuels within GRSG habitat and FRCC would increase the potential for high intensity fires throughout the planning area.

Continued large wildfires due to drought conditions and increasing fine fuels due to establishment and spread of annual invasive plants have increased demands on fire suppression operations and emergency stabilization and rehabilitation efforts. Emergency stabilization and rehabilitation efforts have limited establishment and spread of annual invasive plants (e.g., cheatgrass) in areas treated. This could impact Wildland Fire Management through increased personnel requirements, and increased need for fire-suppression activities, as well as increased costs to the wildland fire management program.

Past, future and ongoing fuels treatments within the planning area, including hazardous fuels reduction, prescribed fires, chemical and mechanical treatment, and seeding, would likely continue and potentially increase in the future. In the short term, impacts would be greatest from treatment planning and implementation costs (refer to **Table 5-39**). However, in the long term, the past and future treatments would improve FRCC. This would move the areas towards a natural fire regime and a reduced risk of uncharacteristic wildfire. Vegetation would become more resistant and resilient and less likely to lose key ecosystem components after a disturbance. Fuels treatments would benefit firefighter and public safety, as well as decrease fire risk and management costs in the long term. Additionally, treatments aimed to protect natural resources from uncharacteristic wildfire would outweigh the short-term impacts upon the landscapes during treatment.

Wildland fire and management may be impacted from climate change trends in the planning area. Generally, increased temperature and longer growing seasons may result in more rapid accumulation of fuels in forested and montane shrubland systems (Brown et al. 2004). This increase of fuel loading would increase the FRCC departure, affecting fire size, intensity and severity resulting in an increase in fire suppression costs, fuels treatment planning and implementation.

In the same forested and montane shrublands, climate change may increase the frequency and duration of droughts increasing fire frequency (Brown et al. 2004). The increased temperatures and longer growing season would also support the expansion of invasive annual grasses and forbs. This effect would also increase fire frequency and extent which would then promote the expansion of invasive annual grasses. This positive feedback loop of fire and invasive plant species may be the greatest impact on fire ecology and management of GRSG (Abatzoglou and Kolden 2011).

The following cumulative effects analysis for each of the alternatives describes the differences in increasing and decreasing impacts on Wildland Fire Management within the PHMA and GHMA over the short term (two years) and over the long term (greater than 20 years).

5.8.1 Alternative A

Under Alternative A, trends as described above would continue to affect fire ecology and management in the planning area.

5.8.2 Alternative B

Under Alternative B, PHMA and GHMA would be a higher priority for fire suppression, thereby impacting management with higher fire management cost. Fuel treatment restrictions could limit fuel treatment opportunities and fuel treatment effectiveness and increase the risk of large wildland fire in this alternative. Increased restrictions on land uses may reduce new sources of ignition and decrease the risk of human-caused ignitions. Though some of these restrictions may limit the ability of the wildland fire management program to suppress and preventatively treat fires, other restrictions, such as restrictions on types of recreation, may also lessen the occurrence of fires, potentially resulting in fewer fires for the planning area as a whole.

5.8.3 Alternative C

Under Alternative C, livestock grazing would be prohibited within the 16,286,800 acres identified in this alternative as PHMA. In the short term, fine fuels would increase throughout GRSG habitat and fire risk would increase as well as FRCC. If fire is established, the increase in fine fuels would increase surface rate of spread and fire intensity (Launchbaugh et al. 2008). This increased potential for large wildland fire would increase costs associated with both fire suppression and post fire rehabilitation. An increase in fire size would increase the exposure to firefighters and public to the inherent risks associated with firefighting.

Under Alternative C, fuels management activities would be limited to the interface of human habitation and previously disturbed areas. Restrictions placed on vegetation management under this alternative would impact the ability to efficiently manage fuels and could increase the potential for wildfire costs of vegetation management and fire suppression. FRCCs would slowly improve over time in areas where natural rehabilitation is achievable. This would indirectly affect fire management actions by increasing fine fuel loads, which increase fire risk and potential burned areas, and increase the need for suppression actions. Alternative C would reduce the flexibility in fuels management activities in the planning area and in fire-suppression activities. Increased restrictions on land uses may reduce new sources of ignition and decrease the risk of human-caused ignitions. The management actions under Alternative C could inhibit the growing need for flexible responses to and preventative treatments for wildland fire.

5.8.4 Alternative D

Alternative D management actions and related impacts would be similar to those described under Alternative B, but with an added emphasis on GRSG seasonal habitat objectives resulting in more site-specific variation in fire ecology

and management impacts. Management under Alternative D would also place added emphasis to pre-suppression planning, prevention, and educational objectives for fire suppression personnel. All vegetation and soils management activities would be prioritized in PHMA and GHMA under this alternative. Treatments would prioritize the use of native seed and establishing appropriate sagebrush species/subspecies that meet GRSG seasonal habitat requirements (see **Table 2-13**, Comparative Allocation Summary of Alternatives). This includes ESR, invasive species/noxious weed, conifer encroachment, and restoration activities. Management actions would be designed to establish and maintain a resilient vegetative community and to reduce habitat fragmentation and maintain or re-establish habitat connectivity over the long term. This would affect FRCCs by trending them to more historic levels. As FRCCs are improved over the planning period, there should be movement towards a natural fire regime and a reduced risk of uncharacteristic wildfire. Vegetation would become more resistant and resilient and less likely to lose key ecosystem components after a disturbance. This could decrease fire size and intensity.

5.8.5 Alternative E

Alternative E would rely on the Nevada Conservation Credit System and an avoid, minimize, and mitigate strategy to achieve a net conservation gain of GRSG habitat. Under this Alternative, the Nevada Sagebrush Ecosystem Technical Team (SETT) would identify and prioritize landscape-level enhancement, restoration, fuel reduction, and mitigation projects to benefit GRSG and its habitat. Without knowing the specific on-the-ground projects that may result from the Conservation Credit System, it is difficult to quantify the level of impacts on fire management. In general, impacts from activities such as planned disturbances or development would be reduced through the application of the avoid, minimize and mitigate strategy, which would decrease the amount of disturbance to vegetation and mitigate any vegetation losses with treatments designed to improve vegetation. This alternative also strives to maintain an ecologically healthy and intact sagebrush ecosystem that is resistant to the invasion of nonnative species and resilient after disturbances such as wildfire. This would affect FRCCs by trending them to more historic levels. As FRCCs are improved over the planning period, there should be movement towards a natural fire regime and a reduced risk of uncharacteristic wildfire. Vegetation would become more resistant and resilient and less likely to lose key ecosystem components after a disturbance. This could decrease fire size and intensity.

5.8.6 Alternative F

Under Alternative F, planning decisions could result in changes in fuel levels or changes to management option for fuels treatments and wildfire suppression. A 25 percent reduction in AUMs for livestock grazing and AMLs for wild horse and burro, in addition to resting 25 percent GRSG habitat from grazing annually could potentially increase fine fuels, making areas more vulnerable to wildfire ignition and increasing the rate of spread in the short term. However, in the long term, there could be a shift toward historical FRCC, an increase in

resilience to disturbance and resistance to invasives thus reducing the risk of high intensity fires, which would increase firefighter safety and decrease wildfire rate of spread potential. Increased restrictions on land uses may reduce new sources of ignition and decrease the risk of human-caused ignitions. These cumulative impacts may result in a greater need for flexibility in access into the planning areas and in fire suppression activities. The management actions under Alternative F that inhibit responses to and preventative treatments for wildland fire may make it difficult to meet the growing need in the future.

5.8.7 Proposed Plan

The Proposed Plan would result in planning decisions that would analyze wildfire/invasive annual grass and conifer expansion threats and identify areas within PHMA and GHMA. The Proposed Plan would emphasize the use of resistance and resilience concepts and the FIAT assessments (see **Appendix G**) that provide a science based background that can inform wildland fire and fuels management strategies as identified in Chambers et al. (2014). The FIAT assessments set the stage for identifying and prioritizing fuel reduction treatments and pre-suppression and suppression activities in PHMA and GHMA. The FIAT would determine potential landscape scale management strategies by considering resilience to disturbance and resistance to invasive annual grasses in GRSG habitat. The management strategies considered in the FIAT include conservation, prevention, restoration, monitoring and adaptive management. The strategies are adapted for fire operations (preparedness, suppression, and prevention activities), fuels management, post-fire rehabilitation, and habitat restoration (Chambers et al. 2014).

Impacts from permitted activities and planned disturbances or development would be reduced under this alternative through the application of the avoid, minimize and compensatory mitigation strategy, which would decrease the amount of disturbance to vegetation and mitigate any vegetation losses with treatments designed to improve vegetation.

5.9 LIVESTOCK GRAZING

The cumulative impact analysis area used to analyze cumulative impacts on livestock grazing includes allotments located entirely or partially within the planning area over the long term (greater than 20 years).

Past, present, and reasonably foreseeable future actions affecting livestock grazing are mainly those that reduce available grazing acreage, restrict management actions or the level of forage production in those areas or that inhibit range improvements, such as water developments or fences.

Relevant examples of past and present actions that have affected livestock grazing include historic grazing practices and wildland fires that have contributed to current ecological conditions, the presence and abundance of competition between grazing wildlife and/or wild horses with livestock, human-caused surface disturbances such as mineral development, transmission and energy

development, infrastructure development, recreation, prescribed burning, vegetation treatments, land disposals, motorized vehicle use, habitat restoration, fuels reduction, and special designations that restrict livestock grazing.

Reasonably foreseeable future actions affecting livestock grazing are similar to past and present actions but include on-going grazing permit renewals. Grazing permit renewals could cumulatively reduce permitted active AUMs and/or restrict livestock grazing management options when management must be altered due to non-attainment or lack of significant progress towards meeting rangeland health standards due to current livestock grazing.

Cumulative projects that increase human disturbance in allotments could also impact livestock grazing forage by increasing the spread of invasive plant species. Invasive plant species can reduce preferred livestock and wildlife forage and increase the chance of invasive species being dispersed by roaming cattle. Cumulative projects that increase human disturbance in allotments could also directly impact livestock grazing by displacing, injuring, or killing animals

5.9.1 Alternative A

Under Alternative A, the majority of the planning area is open to surface-disturbing projects (such as mineral and energy development). While mitigation and stipulations can offset impacts from these projects over time, disturbance to livestock and forage is expected to continue to occur.

On BLM-administered lands, based on environmental conditions and trends (i.e., drought and climate change) livestock grazing management and permitted active use could cumulatively decline under over time. This would be due to the implementation of livestock grazing management changes required to meet rangeland health standards for riparian resources and wildlife and special status species habitats (including GRSG) and levels of surface-disturbing activities. These could include changes to type of livestock, timing, duration or frequency of authorized use, including temporary closures and modifications to range improvements.

Restrictions on the ability to construct or maintain range improvements and conduct vegetation treatments could increase due to the above factors. Although in some cases, range improvements may be required in order to meet rangeland health standards.

Increased sustainable forage levels due to improved grazing management over time could result in increased fuel loads and potentially increased frequency and intensity of wildfire on the landscape. This in turn would likely result in the expansion of invasive annual grass and plant species within and outside the planning area. Prescriptive livestock grazing would be used as a tool to manage fuel loads under this alternative, which would provide additional grazing opportunities for permittees.

Management under Alternative A would allow the most surface disturbance, which would decrease forage availability and cumulatively impact livestock grazing more than the other alternatives.

5.9.2 Alternative B

The goal of this alternative is to maintain and/or increase GRSG abundance and distribution by conserving, enhancing or restoring sagebrush ecosystems upon which GRSG populations depend on in cooperation with other conservation partners (NTT 2011). Due to the restrictions on surface-disturbing activities in GRSG habitat under this alternative, disturbance to livestock and their forage would cumulatively decrease when compared to Alternative A.

Permitted active use would likely decline over time, due to the implementation of livestock grazing management changes required to meet the stated goal of this alternative. Restrictions on livestock grazing in GRSG habitat would result in reduced livestock operations within the planning area.

Proposed management action under Alternative B would restrict the construction and/or maintenance of range improvements, and could also require modification of existing range improvements. Existing vegetation treatments specific to increasing forage for livestock could be modified under this alternative and proposed vegetation treatments would be restricted if they did not provide a direct benefit to GRSG and its habitat. These restriction would decrease livestock forage and increase costs to operators in GRSG habitat.

Reductions in grazing could result in increased fuel loads and increased frequency of wildfire on the landscape, which could reduce long-term forage availability. This in turn would likely result in expansion of invasive annual grass and plant species within and outside the planning area, further reducing forage for livestock. However, increased restrictions on other land uses within the planning area may reduce the occurrence of human-caused ignitions. Prescriptive livestock grazing would also be available as a management tool to manage fuel loads under this alternative, which provides additional grazing opportunities for permittees.

Surface disturbing activities would be avoided or excluded in GRSG habitat and encouraged to take place in non-habitat areas. This would result in declines in permitted use and restrictions to range improvements in non-habitat areas. Concentrating range improvements and other anthropogenic surface-disturbing activities to smaller confined areas would increase the effects on forage availability and livestock grazing management options.

5.9.3 Alternative C

Alternative C would result in the greatest overall reduction in livestock grazing compared to all alternatives. Livestock grazing may not be a viable option for operators within the planning area, even if livestock grazing was concentrated on lands outside of GRSG habitat and/or private lands. Livestock operations

dependent upon BLM/Forest Service allotments containing GRSG habitat would be most affected. Range improvements would not be constructed in PHMA.

Increased forage levels due to the elimination of livestock grazing would result in increased fuel loads and increased frequency of wildfire on the landscape affecting forage production on GRSG habitat, non-habitat areas and private lands. This would likely result in the expansion of invasive annual grass and plant species within and outside the planning area, reducing the abundance and availability of preferred livestock forage species.

Surface-disturbing activities would be concentrated outside of GRSG habitat on public and on private lands which would conflict with livestock grazing uses in those areas.

5.9.4 Alternative D

Permitted active use would decline over time due to the implementation of livestock grazing management changes required to maintain or enhance GRSG habitat. Management changes would include changes to type of livestock, timing, duration, intensity or frequency of authorized use, including temporary closures. Restriction on grazing in GRSG habitat could result in livestock operations being scaled down to a point where the viability of ranching operations could be compromised.

Range improvements would only be authorized in GRSG habitat when they directly benefit GRSG and its habitat. Range improvements would be evaluated and modified or removed if they were not beneficial to GRSG or their habitat. Restrictions on constructing or maintaining range improvements and conducting vegetation treatments would cumulatively impact livestock grazing practices and could increase operator's costs. However, in some cases, range improvements may be required to implement changes needed to livestock grazing management.

Reducing levels of grazing could maintain sustainable forage; however it would likely result in increased fuel loads and increased frequency of wildfire both inside and outside the planning area. This situation would be balanced by greater flexibility in fuels management options which would reduce the potential for changes in fuel loads that would increase the cumulative risk of wildland fires in the planning area. Prescriptive livestock grazing would also be available as a management tool to manage fuel loads under this alternative which provides additional grazing opportunities for permittees.

Surface disturbing activities would be avoided or excluded in GRSG habitat and encouraged to take place in non-habitat areas. This would result in declines in permitted use and restrictions to range improvements in non-habitat areas. Concentrating range improvements and other anthropogenic surface-disturbing activities to smaller confined areas would increase the effects on forage availability and livestock grazing management options.

5.9.5 Alternative E

The objective of this alternative is a net conservation gain of core, priority, and general GRSG habitat within the SGMA from anthropogenic surface-disturbing activities, which could protect sustainable livestock forage more than under Alternative A.

Implementation of prescribed livestock grazing practices would result in changes to current permitted grazing use in some areas. These would include changes to type of livestock, timing, duration, intensity or frequency of authorized use.

Construction and maintenance of range improvements would increase under this alternative. Range improvements would be designed to benefit both livestock grazing and GRSG habitat. Implementation of proper grazing management would rely on infrastructure such as pasture fences and water developments designed to mitigate the effects of improper grazing use on GRSG habitat. Riparian management would rely on the development of fencing and off-site water. Due to the extent of riparian area acreage present in GRSG habitat, this would increase the infrastructure footprint in priority habitat.

Surface disturbing activities would likely be concentrated in non-habitat and non-BLM/Forest Service areas outside of GRSG habitat which could cumulatively impact livestock grazing use on those areas.

5.9.6 Alternative F

Sustainable forage would be expected to increase over the long term under Alternative F. This alternative rests 25 percent of the acreage annually and then limits use to 25 percent of current production on the areas that are available each year to livestock grazing. These restrictions on livestock grazing use in GRSG habitat would result in an overall reduction in livestock grazing. Restrictions on grazing in GRSG habitat would result in operations being scaled down and operational viability could be compromised. Fewer range improvements would be constructed.

Existing vegetation treatments specific to increasing forage for livestock could be modified under this alternative and proposed vegetation treatments would be restricted if they did not provide a direct benefit to GRSG and its habitat. These restriction would decrease livestock forage and increase costs to operators in GRSG habitat.

Reducing levels of grazing could maintain sustainable forage. However reductions in livestock grazing on public lands would likely increase fuel loads and contribute to increased wildfire intensity and frequency. Wildland fire would affect lands both inside and outside the planning area and decrease the sustainable forage available for grazing. This situation would be balanced by greater flexibility in fuels management options which would reduce the potential for changes in fuel loads that would increase the cumulative risk of wildland fires. Prescriptive grazing would also be available as a management tool to

manage fuel loads under this alternative, which provides additional livestock grazing opportunities for permittees.

Surface disturbing activities would be avoided or excluded in GRSG habitat and encouraged to take place in non-habitat areas. This would result in declines in permitted use and restrictions to range improvements in non-habitat areas. Concentrating range improvements and other anthropogenic surface-disturbing activities to smaller confined areas would increase the effects on forage availability and livestock grazing management options, as well as the viability of livestock operations within the planning area.

5.9.7 Proposed Plan

Permitted active use would likely decline over time due to the implementation of livestock grazing management actions required under the Proposed Plan which maintain or enhance GRSG habitat. These could include changes to type of livestock, timing, duration, intensity or frequency of authorized use, including temporary closures. Restrictions on livestock grazing in GRSG habitat could result in livestock operations being scaled down and the viability of ranching operations could be compromised.

Range improvements would only be authorized in GRSG habitat when they directly benefit GRSG and its habitat. Range improvements would be evaluated and modified or removed if not beneficial to GRSG and its habitat. Restrictions on constructing or maintaining range improvements and conducting vegetation treatments to directly benefit livestock would cumulatively impact livestock grazing practices and could increase the operator's costs. In some cases, range improvements may be required to implement changes needed to livestock grazing management. Vegetation treatments would be rested for a minimum of two years or until treatment objectives are met; closing the area to livestock grazing. Allotments which fall within SFAs would have the greatest impact on livestock grazing.

The incorporation of the GRSG habitat objectives (**Table 2-2**) when conducting range land health assessment and changes in management would maintain and/or increase livestock forage. However, it could increase forage levels due to reduced levels of livestock grazing and result in increased fuel loads and increased frequency of wildfire, both inside and outside of the planning area, which would reduce forage availability. This situation would be balanced by greater flexibility in fuels management options (such as implementing vegetation treatment acres identified through VDDT modeling, and using the resistance and resilience concepts and FIAT assessments [**Appendix G**]) which would reduce fuel loads, decrease invasive annual grasses and make sagebrush communities more resilient to cumulative impacts from wildland fire. Prescriptive livestock grazing management would allow livestock grazing to be used as a management tool to manage fuel loads under this alternative which provides additional livestock grazing opportunities for permittees.

Surface-disturbing activities would be avoided or excluded in GRSG habitat and encouraged to take place in non-habitat areas. This would result in declines in permitted use and restrictions to range improvements in non-habitat areas. Concentrating range improvements and other anthropogenic surface-disturbing activities to smaller confined areas would increase the effects on forage availability and livestock grazing management options.

5.10 RECREATION

The cumulative impact analysis area for impacts from proposed management actions on recreation includes all GRSG habitats within the sub-region over the long term (greater than 20 years).

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely to continue to affect recreation include large electrical transmission lines, pipeline projects, and similar linear ROW development projects that conflict with recreation opportunities. In addition, mineral extraction and oil and gas development would impact recreation opportunities by conflicting with recreation users and through the creation of noise and visual disruptions that affect recreation user experiences.

Cumulative impacts on recreation include ground disturbance and restrictions on recreational uses from management actions from other programs. The nature and type of cumulative impacts depends on such variables as project design features, management strategies, mitigation programs, special designations and other factors.

5.10.1 Alternatives Analysis

The degree of conflict with recreation users and creation of barriers to recreation opportunities would be greatest under Alternative A because of fewer restrictions on conflicting activities. The implementation of increased restrictions to protect GRSG under Alternatives B, C, D, E, F and the Proposed Plan such as ROW exclusion, and closure to mineral development would result in the fewest impacts on recreation.

At the same time, management to protect GRSG under Alternatives B, D, F and the Proposed Plan would only allow SRPs in PHMA that have a neutral or beneficial effect on GRSG habitat. As a result, some types of permitted activities (e.g., OHV races) that could negatively affect GRSG and its habitat may be impacted, resulting in fewer opportunities to engage in the types of events and activities affected.

Management under Alternative F, which would seasonally prohibit camping and other non-motorized recreation activities within four miles of active and pending leks, would have minimal impact on recreational opportunities such as camping, mountain biking, hiking, and hunting. Additional management actions that would seasonally prohibit camping and other non-motorized recreation

activities between March 1 and May 15 within four miles of active leks would decrease the area available for recreational opportunities such as camping, mountain biking, and hiking, resulting in seasonal reductions in recreational opportunities. Restrictions would occur when recreational activities are minimal due to weather and ground conditions. Reasonably foreseeable trends that would result in cumulative impacts on recreation include continued growth patterns in demand for all recreation experiences, increased demand for close-to-home recreation opportunities for local residents, continued and increased visitation from a growing regional population, and increased popularity of adjacent public lands. In the long term, impacts would likely be greater near urban areas. As populations increase, especially around the Reno/Sparks metropolitan area, restrictions associated with GRSG management could become more constraining due to the increased demand for certain recreational activities. However, restrictions on development of public lands to protect GRSG habitat could cumulatively benefit recreation.

5.11 TRAVEL AND TRANSPORTATION MANAGEMENT

The cumulative impact analysis area for impacts from proposed management actions on travel management includes all GRSG habitats within the sub-region over the long term (greater than 20 years).

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely to continue to affect travel management are the result of management actions to limit motorized travel to existing routes.

5.11.1 Alternatives Analysis

Under Alternative A there would be no new restrictions related to GRSG habitat management, and no change in impacts on travel management. Management under Alternative B would limit motorized travel to existing roads and trails in PHMA, thereby reducing cross-country access in those areas. Alternatives C, D, E and the Proposed Plan would limit motorized use in both PHMA and GHMA, further reducing cross-country travel. Alternatives B and E limit routed construction to realignments of existing routes only. Alternatives D, E and the Proposed Plan provide for new road construction as long as there is a net conservation gain and construction maintains or enhances GRSG habitat. Reduction in road and trail access would be greatest under Alternative F due to management that would limit motorized use in both PHMA and GHMA and prohibit new road construction within four miles of active and pending leks.

Reasonably foreseeable trends that would result in cumulative impacts on travel and transportation include continued growth patterns in demand for OHV recreation experiences, continued and increased visitation from a growing regional population, and increased popularity of adjacent public lands. In the long term, impacts would likely be greater near urban areas. As populations increase, especially around the Reno/Sparks metropolitan area, restrictions associated

with GRSG management could become more constraining due to the increased demand for OHV recreational activities.

5.12 LAND USE AND REALTY

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect lands and realty include new electrical transmission line-development projects, utility-scale wind energy development, and other minor ROWs (e.g., distribution lines, roads, and communication sites).

There are currently several ROWs that exist in the planning area for various uses including roads, communication sites, electrical transmission and distribution lines, pipelines, fiber-optic lines, and renewable energy. Currently there is only one utility-scale wind development in the planning area, which is the Spring Valley Wind facility in White Pine County, Nevada. These projects would continue to affect lands and realty over the long term (10 years or more), while helping the state and nation meet its renewable energy goals and provides utilities and access on federally-managed lands.

Anticipated future development within and outside the planning area would also directly and indirectly affect lands and realty in the near- (1-5 years) and long term. For example, the TransWest Express 600kV project is being designed to deliver energy generated at large-scale wind energy development sites in Wyoming and the Dakotas to large load centers, such as Las Vegas, NV. Since California and Nevada are located between generation sources and several load centers throughout the west, the TransWest Express and other transmission lines (e.g., TransWest and others identified in **Table 5-39**) would continue to indirectly affect lands and realty in the sub-region. For example, these new transmission lines may encourage new utility-scale developments in or directly adjacent to the planning area.

Proposed transmission lines within the planning area, including the Southwest Intertie Line in eastern Nevada, which may have been authorized but not fully constructed would be required to meet the GRSG screening criteria and RDFs before the BLM would issue a notice to proceed. Construction of the Southwest Intertie line would allow for the co-location of similar linear ROWs in the future.

Impacts on lands and realty across alternatives are largely dependent on the number of acres where the BLM and the Forest Service would exclude or avoid new ROWs development. Since ROW exclusion designations prevent new ROW development, the resulting impact on the lands and realty program would be an inability to accommodate new ROW infrastructure in exclusion areas. **Table 5-40** applies to areas in GRSG habitat.

Table 5-40
ROW Exclusion and Avoidance Areas by Alternative
(BLM-administered Lands and National Forest System Lands)

	Alternative						Proposed Plan ¹
	A	B	C	D	E	F	
Exclusion	1,884,300	10,056,000	16,526,600	1,884,300	1,456,200	10,056,000	1,483,600
Avoidance	0	6,470,600	0	14,642,300	15,070,400	6,470,600	15,329,200

¹Areas shown for the Proposed Plan are for minor ROWs. The Proposed Plan would avoid minor ROW development on 9,255,400 acres, while the remaining 6,073,800 acres would be managed as open.

Source: BLM and Forest Service GIS 2013, acres rounded to the nearest one hundred acres.

The Proposed Plan would result in cumulative impacts on the BLM-administered lands and realty program by placing restrictions on future ROW development (i.e., through avoidance and exclusion criteria). Management under Alternatives B through F would result in varying degrees of restrictions on ROW development, with Alternatives B, C, and F being the most restrictive. Conversely, limitations on mineral development under Alternatives B, C, and F would decrease demand for new ROWs to support those types of activities. Management under Alternative D would be similar to the Proposed Plan, except that it would impose greater restrictions in GHMA.

Limitations on land tenure/landownership adjustments (which provide the BLM with opportunities to sell, exchange, withdraw, or acquire lands and the Forest Service to exchange, purchase, donate, and acquire ROWs to achieve the optimum landownership pattern) would be the most restrictive under Alternatives C and F, and least restrictive under Alternative A. Management under Alternatives D, E, and the Proposed Plan would allow land sales under certain conditions. Under the Proposed Plan, the withdrawal of lands from locatable mineral development in the SFAs would reduce the long-term demand for new ROWs in those areas. Acquisition by purchase, exchange or donation of private lands, including those with intact federal mineral rights, would result in greater land management efficiency where the acquisitions result in a more consolidated land pattern.

The Lincoln County Conservation, Recreation, and Development Act (Public Law 108-424) was signed in 2004 allowing for the disposal of 90,000 acres of federal land as identified in the Ely RMP. Approximately 6,900 acres of PHMA and 200 acres of GHMA have been identified for disposal in the planning area.

The White Pine County Conservation, Recreation, and Development Act (Public Law 109-432) was enacted in 2006. It allowed for the disposal of 45,000 acres of federal lands in White Pine County, of which 5,700 acres of GHMA and 600 acres of PHMA are identified for disposal.

5.12.1 Alternative A

Management under this alternative has the least number of acres (1,884,300 acres) that would be managed as ROWs exclusion areas. Pending and existing ROWs would continue to be managed through the same process as directed by existing LUPs.

Management under this alternative would also have the least amount of restrictions on land tenure/landownership adjustments.

5.12.2 Alternative B

Management under this alternative has an increased number of acres designated as ROW exclusion (10,056,000 acres) and ROW avoidance areas (6,470,600 acres). Pending ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and heightened mitigation cost. Existing ROWs would have to undergo new restrictions. For example, existing power lines within PHMA would be evaluated to determine if removal, burying, or modification is possible. Management of PHMA as exclusion could divert future ROW development to areas outside of PHMA with the potential for higher concentrations of ROW development in non-GRSG habitat areas. Combined with past, present, and reasonably foreseeable future actions, Alternative B may result in new development challenges outside of GRSG habitat if those areas become overly concentrated with ROWs.

In GHMA, the amount of land available for disposal (480,500 acres) would be the same as Alternative A. In PHMA, the BLM would retain land ownership; there would be no lands available for disposal. Limitations on land tenure adjustments (disposals) in PHMA could prevent expansion of rural development or local government uses, including resolution of trespass. Retention, acquisition, and exchange of lands in GRSG habitat could result in more contiguous land patterns and ownership.

5.12.3 Alternative C

Management under this alternative would have the most acres (16,526,600 acres) that would be managed as ROW exclusion areas. Pending ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and potential mitigation cost. New ROWs would have to undergo new restrictions when maintaining and managing the existing ROWs. For example, when new ROWs associated with valid existing rights are needed, they must be co-located within existing ROWs to achieve a net conservation gain of PHMA. Management of GRSG habitat as exclusion, including areas within existing designated corridors (including the Section 368 energy corridor), would divert future ROW development to areas outside of GRSG habitat with the potential for higher concentrations of ROW development in non-GRSG habitat areas.

Under this alternative, land tenure adjustments/landownership adjustments would have less flexibility in GRSG habitat than under Alternative A. For example, all public lands in ACECs, PHMA, and identified restoration and

rehabilitation areas would be retained in public ownership. Limitations on land tenure adjustments (disposals) in GRSG habitat would prevent any expansions of rural development or local government uses, including resolution of trespass. Alternative C would prevent disposal of isolated parcels that are difficult for BLM to manage. Retention and acquisition of lands in GRSG habitat could result in more contiguous land patterns and ownership.

5.12.4 Alternative D

Management under this alternative would increase the amount of ROW avoidance areas (15,070,400 acres) compared to Alternative A. The amount of land managed as ROW exclusion for all ROWs except renewable energy ROWs would be the same as Alternative A. Pending ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and potential mitigation cost. Existing ROWs would not be subject to new restrictions until an amendment or renewal process. Additional requirements for ROW development in avoidance areas could divert future ROW development to areas outside of GRSG habitat with the potential for higher concentrations of ROW development in non-GRSG habitat areas.

The cumulative effects of land tenure under Alternative D would be the same as Alternative B.

Under Alternative D, ROW authorizations in GRSG habitat would be required to apply RDFs to minimize impacts on GRSG and its habitat. Application of RDFs, such as consolidating ROWs within existing utility corridors, could result in long-term impacts on the availability of lands suitable for consolidated development. Over time, if corridors become overcrowded with ROW development, they could become unfeasible for additional development, which could result in costly retrofitting of existing infrastructure to increase capacity or redirect new development to areas outside of GRSG habitat. This could cumulatively impact the utility market by potentially reducing the service availability to customers.

5.12.5 Alternative E

Under Alternative E, for California, the amount of lands managed as ROW avoidance and exclusion areas would be the same as Alternative A with equivalent impacts. In Nevada only, 14,463,000 acres would be managed as ROW avoidance areas and 1,290,800 would continue to be managed as exclusion areas.

Management under this alternative would have an increased amount of acres managed as ROW avoidance on Nevada lands, compared to Alternative A. Pending ROWs within GRSG habitat in Nevada would be subject to the State of Nevada Conservation Credit System and consultation with the SETT, including the concept of “avoid, minimize, and mitigate.” Where development could not be avoided in GRSG habitat, projects would be required to offset disturbance in GRSG habitat through mitigation measures, which could increase costs and

processing times. Additional requirements for ROW development in GRSG habitat in Nevada could divert future ROW development to areas outside of GRSG habitat with the potential for higher concentrations of ROW development in non-GRSG habitat areas.

Cumulative effects on land tenure under Alternative E would be the same as Alternative A.

Under Alternative E, in Nevada only, ROW authorizations in GRSG habitat would be required to apply RDFs to minimize impacts on GRSG and its habitat. Application of RDFs, such as consolidating ROWs within existing utility corridors and burying power lines, could result in long-term cumulative impacts on the availability of lands suitable for consolidated development. Requirements to bury transmission lines could result in the added cost of the development prohibiting completion or restricting the scope of the project. Over time, new ROW development could become unfeasible in existing corridors if they become overcrowded. This could result in costly retrofitting of existing infrastructure to increase capacity or new development being redirected to areas outside of GRSG habitat. This could impact the utility market by potentially reducing the service availability to customers.

5.12.6 Alternative F

Under Alternative F, the requirement to co-locate new ROW development with existing infrastructure would decrease the total area where new development would be allowed. Identifying the desired locations for future development provides a level of certainty as to the location of future infrastructure, including co-located ROWs. However, the limited amount of lands in the planning area associated with corridors containing existing ROW development could eventually preclude additional development as those corridors become fully occupied. Co-locating new infrastructure would likely increase the complexity and costs of new ROW development. The resulting cumulative impact of Alternative F could be a reduction in service availability to customers within and outside of the planning area.

Under Alternative F, the BLM and the Forest Service would retain public ownership in PHMA with no exceptions. Impacts from land tenure would be the same as those under Alternative B, with the exception that the BLM and the Forest Service would propose all PHMA, including mineral split-estate, for mineral withdrawal. Limitations on land tenure adjustments (disposals) in PHMA could prevent any expansions of rural development or local government uses, including resolution of trespass. Retention and acquisition of lands in GRSG habitat could result in more contiguous land patterns and ownership.

5.12.7 Proposed Plan

Management under the Proposed Plan would result in more acres being managed as ROW avoidance areas for new ROWs compared to Alternative A. Specifically, PHMA and GHMA (15,104,700 acres) would be designated as ROW

avoidance areas for new major ROW's. GHMA would be managed as open to new minor ROWs. The BLM and Forest Service would allow minor ROWs within PHMA to occur if development incorporates specific conditions, mitigation measures and stipulations provided in the GRSG screening criteria and **Appendix D** (RDFs) that would result in a net conservation gain of GRSG habitat. RDFs such as the application of perch deterrents could increase the cost of development for a local utility company to the point where it is not feasible to distribute utilities to a rural area.

Pending and future major and minor ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and potential mitigation cost. Major ROWs would incur higher restrictions and greater cumulative effects than minor ROWs due to the designation of ROW avoidance areas. Existing ROWs would not be subject to new restrictions until the amendment or renewal process. For example, requiring existing ROW holders to retrofit existing authorized infrastructure to minimize impacts on GRSG could result in an increased operating cost, which could be distributed to the consumer (see **Section 5.19**, Social and Economic Impacts).

The proposed TransWest Express project is a high-voltage electric transmission within the southeastern Nevada subpopulation. GRSG conservation measures identified in the Proposed Plan would not be applicable to this project for reasons outlined in Chapter 4. However, if constructed this project would count towards the 3 percent disturbance cap for the applicable BSUs within PHMA. The TransWest Express project would also impact future development within the applicable BSUs and would provide opportunity for co-location for future ROWs.

The authorized Southwest Intertie project is also a high-voltage electric transmission within the southeastern and northeastern Nevada subpopulations. Although authorized in the mid 1990's, the northern half of the line into Idaho has not been constructed to date. If constructed, this project would most likely need to refresh its NEPA review process to ensure consistency with the conservation measures in this Amendment. This project would also impact future development within the applicable BSUs and would provide opportunity for co-location for future ROWs.

Co-location would likely increase costs and project review times, but could allow the BLM and Forest Service to accommodate a portion of the future ROW demand in GRSG habitat, while still achieving GRSG conservation objectives.

The Proposed Plan identifies existing corridors as the preferred locations for future ROW development. However, this alternative would also result in 80 percent fewer acres of designated existing utility corridors compared to Alternative A and would limit corridor widths to 3,500 feet. Accordingly, linear ROW applicants would have fewer opportunities to site infrastructure within

the corridors. If a corridor becomes fully occupied, then the BLM or Forest Service would request that a new ROW applicant consider alternative alignments outside GRSG habitat, co-locate the project within existing infrastructure, site the project outside the corridor but still within GRSG habitat subject to the GRSG screening criteria and RDFs, or in circumstances when the project is deemed to be financially or technically infeasible, not to pursue the project.

Land tenure actions would be allowed in GRSG habitat if they can demonstrate a net conservation gain to GRSG habitat. Allowing certain land tenure actions could create a more contiguous decision area and increase short- and long-term land management efficiency. Land exchanges or disposal to remove low quality habitat from BLM-administered land would also increase efficiency where those lands are isolated and difficult to manage.

Under the Proposed Plan, ROW authorizations in GRSG habitat would be required to apply RDFs to minimize impacts on GRSG and its habitat. Application of RDFs, such as co-locating within existing ROWs, could result in long-term impacts on the availability of lands suitable for co-located development.

Impacts from Adaptive Management

In PHMA, where a lands and realty activity has resulted in a hard trigger being reached, the corresponding adaptive management responses are identified in **Table 2-9. Table 5-41** below describes the effects on ROWs within the affected BSU.

Table 5-41
PHMA Adaptive Management Cumulative Effects

Program Area Activity	Corresponding Analysis
ROWs in Corridors	In BSUs where a ROW within the designated corridor is found to be the cause of the declining GRSG trend, new ROWs in the portion of the corridor within the BSU would incur added costs associated with retrofitting or relocating ROW infrastructure to minimize effects on GRSG.
Major ROWs outside Corridors	Same as Alternatives B, C, and F
Minor ROWs outside corridors	Same as Alternatives B, C, and F

In GHMA, where a lands and realty activity has resulted in a hard trigger being reached, the corresponding adaptive management responses are identified in **Table 2-10. Table 5-42** below describes the effects on ROWs within the affected BSU.

Table 5-42
GHMA Adaptive Management Cumulative Effects

Program Area Activity	Corresponding Analysis
ROWs in Corridors	In BSUs where a ROW within the designated corridor is found to be the cause of the declining GRSG trend, new ROWs in the portion of the corridor within the BSU would incur added costs associated with retrofitting or relocating ROW infrastructure to minimize effects on GRSG.
Major ROWs outside Corridors	Same as Alternatives B, C, and F
Minor ROWs outside corridors	Same as Alternatives B and D

5.13 RENEWABLE ENERGY RESOURCES

The Solar PEIS (BLM 2012h) excludes utility-scale solar energy development on all BLM-administered lands in the planning area. There is currently no utility-scale solar development within the planning area. With the exception of some special designation areas, the planning area is currently open to wind energy ROWs.

There are currently four pending wind energy development applications and five testing applications within the planning area (BLM 2015b).

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect wind and solar energy development are the construction and maintenance of existing and proposed roads and transmission corridors. The construction would likely have less of a cumulative effect than construction associated with electrical transmission line development by increasing the routing options and possibly reducing overall project construction or implementation costs. The primary indicator of impacts on renewable energy is whether an alternative restricts the availability of BLM-administered lands or National Forest System lands to a level below that of Alternative A.

Assuming the potential exists for renewable energy development in the planning area; impacts across alternatives are largely dependent on the number of acres the BLM and Forest Service would manage as ROW exclusion or avoidance for new energy development and the restrictions such management would impose. The level of cumulative impact on renewable energy development is dependent upon the resource potential within the sub-region. For example, wind energy development may be impacted more than solar development since there is a higher wind energy generation potential within the sub-region. Since ROW exclusion would prevent new renewable energy ROW development, the resulting impact on renewable energy development would be an inability to accommodate new renewable energy ROW infrastructure in the exclusion

areas. In avoidance areas, additional restrictions on development could eliminate the economic viability of the project due to the potential costs of mitigation measures. It should be noted that a Forest Plan Prescription Area on National Forest System land either restricts or prohibits certain uses and is considered the same as a BLM exclusion or avoidance.

In general, cumulative impacts on wind energy would be greatest under Alternatives B, C, D, and F, since these alternatives would implement management strategies that would place more restrictions on development compared to Alternative A. In contrast, management under Alternative A would place the fewest restrictions on the wind energy program and would, therefore, be expected to contribute the fewest cumulative impacts on wind energy. Management under Alternatives E and the Proposed Plan would also place restrictions on wind energy development (e.g., by managing areas as wind energy ROW avoidance) but to a lesser extent than under Alternatives B, C, D, and F. Management under Alternative E and the Proposed Plan would, therefore, be expected to cumulatively contribute to fewer impacts on wind energy development than Alternatives B, C, D, and F, but more impacts than Alternative A.

Table 5-43 applied to PHMA and GHMA.

Restrictions in Alternatives B and C would prevent ROWs from being located in PHMA, while Alternatives D and E would avoid siting ROWs in PHMA if possible, preserving management flexibility at the expense of localized GRSG habitat degradation. Management under Alternative A would not restrict the siting of ROWs, although, existing policy does recommend co-locating ROWs, where possible.

Table 5-43
Renewable Energy ROW Exclusion and Avoidance Acres by Alternative in the Planning Area (BLM-administered and National Forest System Lands)

	Alternative				
	A	B	C/D/F	E	Proposed Plan
Exclusion	1,884,300 Wind	10,120,700 Wind	16,526,600 Wind	1,456,300 Wind	10,759,400 Wind
	13,957,800 Solar	13,957,800 Solar	16,526,600 Solar	13,957,800 Solar	16,812,800 Solar
Avoidance	0 Wind	6,405,900 Wind	0 Wind	15,070,300 Wind	6,053,400 Wind
	1,938,700 Solar	1,964,200 Solar	0 Solar	1,938,700 Solar	0 Solar

Source: BLM and Forest Service GIS 2015

5.13.1 Alternative A

Under Alternative A, 1,884,300 acres would be managed as ROW exclusion or avoidance areas for wind energy development and 13,857,800 acres would be managed as solar ROW avoidance areas.

Management under this alternative would be the least restrictive to renewable energy ROWs, particularly wind, because the fewest acres would be managed as avoidance and exclusion areas. Pending and existing renewable energy ROWs would continue to be managed through the same process as directed by under Alternative A.

5.13.2 Alternative B

Under Alternative B, 10,120,700 acres of BLM-administered and National Forest System lands with wind potential would be managed as ROW exclusion areas and would not be open for renewable energy ROW applications while 6,405,900 acres would be managed as avoidance areas. For Solar ROW development 13,957,800 acres would be excluded for solar energy ROWs while 1,964,200 acres would be managed as solar ROW avoidance areas (National Forest System land only). Management under this alternative would have the most impact on renewable energy ROWs compared to Alternative A due to the number of acres managed as ROW avoidance and exclusion areas. Pending renewable energy ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and heightened mitigation cost. Existing renewable energy ROWs would have to undergo new restrictions. For example, facilities would have to be co-located if they can be completed within any existing disturbance associated with ROWs.

5.13.3 Alternative C

Under Alternative C, 16,526,600 acres of PHMA would be excluded from wind and solar development ROW applications.

Management under this alternative would impact renewable energy ROWs more than Alternative A due to the number of acres managed as ROW exclusion. Pending renewable energy ROWs within GRSG habitat could be rejected or withdrawn due to the elimination of lands available for development. Potential future renewable energy development would be prohibited in PHMA, which would force development to occur outside these areas or on private lands. Due to the land ownership in the sub-region placing any type of utility scale renewable energy development on private lands would be limited.

5.13.4 Alternative D

Under Alternative D, the cumulative impacts on wind and solar development would be the same as Alternative C.

Existing renewable energy ROWs would not be subject to new restrictions until a renewal or an amendment is needed. The 150 MW Spring Valley Wind Project is the only approved and constructed wind energy ROW in the planning area. Because the Spring Valley Wind Project is currently constructed with an approved ROW, the requirements in the Proposed Plan would not apply to this project in the near-term. However, at the time the project ROW becomes subject to renewal, the BLM could require applicable GRSG conservation measures, including RDFs such as perch deterrents.

5.13.5 Alternative E

Under Alternative E, for California, the amount of lands managed as ROW exclusion areas would be the same as Alternative A. In Nevada only, 14,462,900 acres would be managed as ROW avoidance areas, which is more restrictive than Alternative A, but less restrictive than Alternatives B, C, D, F, and the Proposed Plan. Management under this alternative would impact renewable energy ROWs due to the number of acres managed as ROW avoidance. Pending renewable energy ROWs within GRSG habitat could be rejected or withdrawn due to restrictions and potential mitigation costs. New renewable ROWs would have to undergo new restrictions. For example, all renewable energy proposals would require state agency review.

Under Alternative E, in Nevada only, ROW authorizations in GRSG habitat would be required to apply RDFs to minimize impacts on GRSG and its habitat. Application of RDFs, such as consolidating ROWs within existing utility corridors and burying power lines, could result in long-term cumulative impacts on the availability of lands suitable for consolidated development that would support renewable energy development within and outside GRSG habitat.

Impacts on existing wind energy developments would be the same as Alternative D.

5.13.6 Alternative F

Cumulative impacts under Alternative F would be the same as Alternative C with the exception that wind energy development projects would not be permitted to be sited within four miles of the perimeter of GRSG winter habitat, or within five miles of an active or pending lek. Management under Alternative F would result in the greatest limitation on renewable energy development compared to the other alternatives. The distance requirement in siting wind energy projects from active and pending leks could result in areas outside of PHMA and GHMA being excluded from wind energy development.

5.13.7 Proposed Plan

Under the Proposed Plan, PHMA would be managed as ROW exclusion for utility-scale commercial wind and solar energy facilities. GHMA would be managed as exclusion for solar energy and avoidance for wind energy. Only utility-scale commercial wind energy projects would be allowed in GHMA (6,053,400 acres).

Management under this alternative would have greater ROW avoidance acres for new wind energy development (6,053,400 acres) than under Alternative A. All wind and solar ROW applications in PHMA would be rejected and pending wind ROWs within GHMA could be rejected or withdrawn due to restrictions and mitigation cost.

Impacts on existing wind energy developments would be the same as Alternative D.

Impacts from Adaptive Management

In PHMA, where a renewable energy activity has resulted in a hard trigger being reached, the corresponding adaptive management responses are identified in **Table 2-9. Table 5-44** below describes the effects on LUAs within the affected BSU.

Table 5-44
Adaptive Management Cumulative Effects

Program Area Activity	Corresponding Analysis
Wind Energy ROWs	Same as Proposed Plan
Solar ROWs	Same as Proposed Plan

In GHMA, where a renewable energy activity has resulted in a hard trigger being reached, the corresponding adaptive management responses are identified in **Table 2-10. Table 5-45** below describes the effects on ROWs within the affected BSU.

Table 5-45
GHMA Adaptive Management Cumulative Effects

Program Area Activity	Corresponding Analysis
Wind Energy ROWs	Same as the Proposed Plan for PHMA
Solar ROWs	Same as Proposed Plan

5.14 MINERAL RESOURCES

5.14.1 Fluid Minerals

The cumulative impact analysis area for impacts from proposed management actions on fluid minerals includes all GRSG habitats within the planning area.

The past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect leasable minerals are: lease stipulations, lands and realty actions, socioeconomics, and existing and planned oil, gas and geothermal development projects within and directly outside the decision area. **Table 5-39** lists fluid minerals projects and lands and realty activities that would add to the cumulative effects.

Socioeconomic factors, such as, the price and demand of oil and gas would cumulatively impact oil and gas exploration and development. Oil and gas exploration and development is also indirectly impacted by global market price fluctuations and supply and demand of oil and gas. When the price and demand for oil is low, it becomes unprofitable to explore for oil in Nevada because of its remoteness and additional costs to mobilize equipment to the state. These socioeconomic factors can indirectly impact oil and gas exploration and development by reducing the amount of oil and gas activity occurring in Nevada.

Socioeconomic factors, such as, the demand for electricity and competing electricity generating technologies would cumulatively impact geothermal exploration and development.

Geothermal and oil and gas development can be indirectly cumulatively impacted by the lands and realty program from permitting requirements for new infrastructure development, such as ROW access for roadways, pipelines, and other related facilities. The nature and type of cumulative impacts depends on such variables as increased costs associated with fluid mineral development, which could prohibit development of a resource. Additionally, increased fluid mineral exploration and development could occur outside of GRSG habitat, which could cause additional unforeseen impacts on other resources. This would affect the fluid minerals RFD scenarios for each alternative based on the cumulative effects (see **Appendix P**). The following cumulative effects analysis for each of the alternatives examines relative differences in increasing and decreasing impacts on geothermal and oil and gas within PHMA and GHMA over the next 20 years.

Alternative A

Geothermal

The management actions under Alternative A would cumulatively impact geothermal leasing, exploration, and development through existing and future surface use restrictions (e.g., closures, NSO, CSU, and TL stipulations) within and outside GRSG habitat on a project by project basis.

Under Alternative A, 14,642,300 acres within GRSG habitat would continue to be open to new geothermal leasing, subject to current standard stipulations. New geothermal development in open areas would continue to be impacted by the restrictions in the lands and realty program.

Cumulative impacts on geothermal exploration and development from fluctuations would continue to occur as identified above.

As outlined in Chapter 4 and **Appendix P**, the RFD scenario was developed by analyzing geothermal exploration and development over the past 30 years in the planning area. Using this analysis, the trend was projected into the future, such that over the next 20 years, 94 new geothermal wells would be drilled and 12 new geothermal power plants would be constructed providing an additional 336 MWs of capacity. As long as the lands remain open to leasing and development with minimal constraints, operators would not be compelled to shift their exploration to private lands. Under Alternative A, any decrease in activity would be minimal, and would remain susceptible to resource demand, drilling costs and market prices.

Oil and Gas

The management actions under Alternative A could cumulatively impact oil and gas leasing, exploration, and development through existing and future surface use restrictions (e.g., closures and NSO, CSU, and TL stipulations) inside and outside GRSG habitat on a project by project basis.

In GRSG habitat under Alternative A, 14,642,300 acres would continue to be open to new oil and gas leasing, subject to current standard stipulations. New oil and gas development in open areas would continue to be impacted by restrictions in the lands and realty program (e.g., ROW exclusion areas).

Cumulative impacts on oil and gas exploration and development from fluctuations would continue to occur as identified above.

The RFD scenario projects that 100 new oil and gas wells (60 wells in the BLM Elko District and 40 wells outside of the Elko District) would be drilled over the next 20 years. As long as the lands remain open to leasing and development with minimal constraints, operators would not be compelled to shift their exploration to private lands. Under Alternative A, any decrease in activity would be minimal, and would remain susceptible to resource demand, drilling costs and market price fluctuations.

Alternative B*Geothermal*

As discussed in Chapter 4, the RFD scenario for Alternative B could reduce geothermal leasing, exploration, and development by 12.7 percent within GRSG habitat. Cumulatively, because of the added restrictions in GRSG habitat, more leasing and development would most likely occur outside of GRSG habitat. Existing leases within GRSG habitat would be managed with current lease stipulations; however additional COAs may be added to protect GRSG habitat.

The increased restrictions in PHMA would cumulatively cost operators more time and money to comply with RDFs, GRSG habitat objectives, seasonal buffers, and other criteria if siting projects in those areas.

When compared with Alternative A, the cumulative impacts from socioeconomic factors and restrictions on lands and realty actions under Alternative B would result in greater cumulative impacts on geothermal leasing, exploration, and development.

Oil and Gas

The management actions proposed under Alternative B would cumulatively impact oil and gas leasing and development similarly to geothermal. As discussed in Chapter 4, the RFD scenario for Alternative B identifies a reduction in oil and gas leasing, exploration, and development by 20 to 33 percent in the planning

area. Additional impacts from socioeconomic and restrictions on lands and realty would be the same as geothermal for Alternative B.

Alternative C

Geothermal

When compared with Alternative A, the management actions proposed under Alternative C would cumulatively reduce geothermal leasing and development through closing PHMA (under this alternative GHMA is included in PHMA). As discussed in Chapter 4, the RFD scenario for Alternative C identifies a reduction in geothermal leasing, exploration, and development by 21.1 percent.

Additional cumulative impacts from socioeconomic factors would be greater than Alternatives A and B for geothermal leasing, exploration, and development. There would not be any additional cumulative impacts from lands and realty on future leasing, exploration, and development within PHMA because these areas would be closed to both resources.

Cumulatively, due to added restrictions in GRSG habitat, more leasing and development could occur outside of GRSG habitat. However, excluding ROW development on approximately 17 million acres of GRSG habitat under this alternative would likely impact the ability for geothermal development to occur in non-habitat areas as well. Development outside GRSG habitat, including development on private lands, would be indirectly impacted over the long term in circumstances where there would be no opportunities to co-locate with existing electrical transmission infrastructure in GRSG habitat or where developing the intertie system entirely outside GRSG habitat would not be feasible or would be cost prohibitive. For example, a developer may have to site a transmission line around BLM-administered lands and National Forest System lands, which would increase time and money and possibly make the project cost prohibitive.

However, on existing leases, there would be greater cumulative impacts under Alternative C from restrictions on lands and realty, such as siting pipelines and transmission lines than under Alternatives A, B, D, E, and the Proposed Plan, and the same impacts as under Alternative F. For existing leases, additional COAs to protect GRSG habitat would cumulatively cost operators more time and money to explore and develop.

Oil and Gas

When compared with Alternative A, the management actions proposed under Alternative C would result in greater cumulative impacts on oil and gas leasing and development by closing PHMA (under this alternative GHMA is included in PHMA). As discussed in Chapter 4, the RFD scenario for Alternative C identifies a reduction in oil and gas leasing, exploration, and development by 28 to 67 percent.

For existing leases, additional COAs to protect GRSG habitat would cumulatively cost operators more time and money to explore and develop.

Additional cumulative impacts from socioeconomic factors and lands and realty would be the same as described for geothermal under Alternative C.

Alternative D

Geothermal

When compared with Alternative A, the management actions proposed under Alternative D would result in greater cumulative impacts on geothermal leasing and development by managing PHMA and GHMA areas as NSO. As discussed in Chapter 4 and **Appendix P**, the RFD scenario for Alternative D could reduce future geothermal leasing, exploration, and development by 13.4 to 21.1 percent. Existing leases would be managed with current lease stipulations.

Lands and realty would have greater cumulative impacts than Alternative A on future geothermal leasing, exploration, and development because GRSG habitat would be managed as ROW avoidance areas.

Existing leases would have the same cumulative impacts under Alternative D as under Alternative E, but less than Alternatives B, C, and F because GRSG habitat would be managed as ROW avoidance areas, by affecting such things as siting pipelines and transmission lines. This would make geothermal development more costly and require more time to issue permits (e.g., to review proposed ROWs that would go through or around GRSG habitat in order to gain access to the project site).

Lands and realty actions under Alternative D could also cumulatively impact development of geothermal projects on private lands within GRSG habitat by limiting access and infrastructure siting (e.g., pipelines, transmission lines) on adjacent BLM-administered lands and National Forest System Lands. For example, a developer may have to site a transmission line around BLM-administered lands and National Forest System Lands, which would increase time and money and possibly make such a project cost prohibitive. However, there would be no cumulative impacts from lands and realty on private lands outside of GRSG habitat.

For existing leases, additional COAs to protect GRSG habitat would cumulatively cost operators more time and money to explore and develop. Therefore, Alternative D would have the same cumulative impacts from socioeconomic factors as Alternative E, but less than Alternatives B, C, and F.

Overall, more leasing and development could occur outside of GRSG habitat.

The 3 percent disturbance cap in PHMA would also impact future geothermal development if activities on federal, state, private or other lands were to reach

the cap. Once the cap is reached, additional disturbance, including geothermal development, would not be allowed.

Oil and Gas

When compared with Alternative A, the management actions proposed under Alternative D would cumulatively impact oil and gas leasing and development by managing PHMA and GHMA as NSO. As discussed in Chapter 4, the RFD scenario for Alternative D could reduce oil and gas leasing, exploration, and development by 25 to 60 percent.

Additional cumulative impacts from socioeconomic factors would be the same as described above for geothermal under Alternative D.

However, cumulative impacts from lands and realty actions on existing and future oil and gas leases in GRSG habitat would be slightly greater than geothermal because there are considerably more existing leases and a demand for future leasing in GRSG habitat than geothermal.

Alternative E

Geothermal

When compared with Alternative A, the management actions proposed under Alternative E would result in greater cumulative impacts on geothermal leasing and development, but less than Alternatives B, C, and D. PHMA and GHMA areas would be managed with CSU and TL stipulations. As discussed in Chapter 4 and **Appendix P**, the RFD scenario for Alternative E could reduce future geothermal leasing, exploration, and development up to 21.1 percent. Existing leases would be managed with current lease stipulations.

Under Alternative E, in Nevada only, all surface-disturbing activities would be required to avoid, minimize, and mitigate impacts on GRSG and its habitat. Operators may experience longer delays and additional costs to get their projects approved. Mitigation requirements may discourage developers from developing leases, including those with moderate to high geothermal potential within GRSG habitat. Areas within core and priority GRSG habitat would be the most affected.

Cumulative impacts in California would be the same as Alternative A.

Under Alternative E, cumulative impacts from socioeconomic factors and lands and realty would be the same as Alternative D, but less than Alternatives B, C, and F for both existing leases and future geothermal leasing, exploration, and development, both within and outside of GRSG habitat.

Management actions under Alternative E would cumulatively impact development of geothermal projects on private lands similar to Alternative D.

Oil and Gas

When compared with Alternative A, the management actions proposed under Alternative E would result in greater cumulative impacts on oil and gas leasing and development, but less than Alternatives B, C, and D. PHMA and GHMA areas would be managed with CSU and TL stipulations. As discussed in Chapter 4 and **Appendix P**, the RFD scenario for Alternative E could reduce future oil and gas leasing, exploration, and development by 15 percent. Existing leases would be managed with current lease stipulations.

Under Alternative E, in Nevada only, all surface-disturbing activities would be required to avoid, minimize, and mitigate impacts on GRSG and its habitat. Operators may experience longer delays and additional costs to get their projects approved. Mitigation requirements may discourage developers from developing leases, including those with moderate to high geothermal potential within GRSG habitat. Areas within core and priority GRSG habitat would be the most affected.

Cumulative impacts in California would be the same as Alternative A.

Additional cumulative impacts from socioeconomic factors and lands and realty would be the same as described above for geothermal under Alternative E.

Alternative F*Geothermal*

Under Alternative F, the cumulative impacts on geothermal resources would be the same as under Alternative C.

Oil and Gas

Under Alternative F, the cumulative impacts on oil and gas resources would be the same as under Alternative C.

Proposed Plan*Geothermal*

When compared with Alternatives A and E, the management actions proposed under the Proposed Plan would result in greater cumulative impacts on geothermal leasing and development, but less than Alternatives B, C, D, and F. The Proposed Plan would result in greater cumulative impacts on geothermal leasing and development by managing PHMA with NSO restrictions with only one exception. SFAs would be managed as NSO without any waivers, exceptions, or modifications. GHMA would be open to leasing, exploration, and development, but would be subject to moderate constraints, such as TL and CSU stipulations, and would be required to avoid, minimize, and apply compensatory mitigation to GRSG habitat.

As discussed in Chapter 4 and **Appendix P**, the RFD scenario for the Proposed Plan could reduce future geothermal leasing, exploration, and

development by 15.7 to 23.7 percent. Existing leases would be managed with current lease stipulations.

Cumulative impacts from lands and realty actions under the Proposed Plan for existing and future geothermal leasing, exploration, and development outside of GRSG habitat and within GHMA would be the same as Alternative A. However, in PHMA (including SFA) there would be additional cumulative impacts because it would be managed as ROW avoidance areas. Overall, the cumulative impacts on geothermal leasing and development from lands and realty actions under the Proposed Plan would be greater than Alternative A, and less than Alternatives B, C, D, E, and F.

Additional cumulative impacts from socioeconomic factors could further cumulatively impact future geothermal leasing, exploration, and development by an additional 10 to 20 percent, because of the added restrictions in GRSG habitat. For existing leases, additional COAs to protect GRSG habitat would cumulatively cost operators more time and money to explore and develop. Overall, more leasing and development could occur outside of GRSG habitat.

The 3 percent disturbance cap would also impact future geothermal development if activities on federal, state, private or other lands were to reach the cap in PHMA. Once the 3 percent cap is reached, additional disturbance, including geothermal development, would not be allowed.

Oil and Gas

As discussed in Chapter 4 and **Appendix P**, the RFD scenario for the Proposed Plan could reduce future oil and gas leasing, exploration, and development by 18 to 25 percent.

The cumulative impacts for oil and gas would be the same as for geothermal under the Proposed Plan, except that PHMA would be managed as NSO with no waivers, exceptions, or modifications. Existing leases would be managed with current lease stipulations.

5.14.2 Locatable Minerals

The cumulative impact analysis area for impacts from proposed management actions on locatable minerals includes lands within the planning area.

The past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect locatable minerals are: lands and realty actions, socioeconomics, and existing and planned locatable mineral development. Given that the locatable minerals program is a non-discretionary program by the BLM and Forest Service, mineral exploration and development would be expected to continue to occur under all alternatives. **Table 5-39** lists all reasonable foreseeable actions for the planning area that would add to the cumulative impacts for locatable minerals.

BLM or Forest Service management that could result in cumulative impacts on locatable minerals include a reduction in the number of submitted lands and realty actions, e.g., ROW exclusion and avoidance areas in GRSG habitat for all alternatives except Alternative A, resulting in a decrease in the ability to develop exploration projects and economically feasible production of mineral resources. Lands recommended for withdrawal from mineral entry would restrict locatable mineral development and reduce the demand for associated lands and realty actions. Socioeconomic impacts would be associated with the price and demand for locatable minerals and the availability of markets for distribution and represents an impact on the potential discovery, development, and use of those resources by decreasing the availability of those mineral resources. The nature and type of cumulative impacts depends on such variables as market fluctuation in price and demand for minerals, available markets for distribution, and new technologies.

The following cumulative effects analysis for each of the alternatives examines relative differences in impacts on locatable minerals within the planning area for the life of the LUP (i.e., approximately 20 years). Locatable minerals do not have associated timeframes with authorizations because of the dependency on mineral resource size and market fluctuation in price and demand. Locatable mineral project durations are determined on a case-by-case basis, depending on the mineral resource reserve.

Alternative A

Under Alternative A, 2,846,600 acres of federal mineral estate would remain withdrawn from location in the planning area under the Mining Law of 1872. No additional acreage is recommended for withdrawal within the planning area under this alternative. Locatable mineral exploration and mining projects, including all associated lands and realty actions, have and would be implemented within the planning area (see **Table 5-39**). There would be no significant socioeconomic cumulative impacts on locatable minerals under this alternative since a large percentage of the planning area would be available to locatable mineral entry and development and no additional restrictions would be applied to mining operations. This alternative would have the least amount of restrictions on locatable mineral development within the planning area.

Table 5-46 shows the total acreage withdrawn, recommended for withdrawal, and open to locatable mineral entry for the entire planning area.

Land uses associated with lands and realty actions would continue under current policies and regulations. Under Alternative A, the majority of the planning area would remain open to surface-disturbing activities associated with lands and realty actions. Cumulative impacts on locatable minerals would be negligible under this alternative since no additional lands are recommended for withdrawal from locatable mineral entry within the planning area.

Table 5-46
Locatable Minerals Withdrawals in Planning Area

Alternative	Withdrawn from Locatable Mineral Entry	Recommended for Withdrawal from Locatable Mineral Entry	Open to Locatable Mineral Entry
Alternatives A, D and E	2,846,600	0	52,232,300
Alternatives B and F	2,846,600	9,342,600	42,889,700
Alternative C	2,846,600	16,005,000	36,227,300
Proposed Plan	2,846,600	2,731,600	49,500,700

Source: BLM and Forest Service GIS 2014

Alternative B

Under Alternative B, an additional 9,342,600 acres (17 percent) would be recommended for withdrawal in the planning area. If the Secretary issues a Public Land Order to formally withdraw these lands, subject to valid existing rights, the location of new mining claims under the Mining Law of 1872 would be forbidden. Exploration and mining would only be allowed on existing valid mining claims. This alternative would restrict locatable mineral development and could cause future proposed projects to be rejected, withdrawn, or closed.

Land uses associated with existing or approved lands and realty actions would continue under current policies and regulations. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Cumulative impacts on locatable minerals would increase under this alternative since additional lands are recommended for withdrawal from locatable mineral entry within the planning area. Impacts would be greater than Alternative A, D, E, and the Proposed Plan, but less than Alternative C.

Socioeconomic cumulative impacts would be similar to those discussed above under general impacts. Under Alternative B, additional lands are recommended for withdrawal from locatable mineral entry, which removes the mineral resources in that area from being accessed and extracted under new mining claims. Existing mining claims in areas withdrawn from locatable mineral entry would have to undergo a validity exam to be approved for notices or plans of operations, which would increase up-front costs of locatable mineral development and could cause operators and workforce to explore mineral developments outside of the planning area. Cumulative impacts on locatable minerals would increase under this alternative since additional lands are recommended for withdrawal from locatable mineral entry and increased costs due to possible validity exams which may deter locatable mineral development within the planning area. Impacts would be greater than Alternative A, D, E, and the Proposed Plan, but less than Alternative C.

Alternative C

Under Alternative C, an additional 16,005,000 acres (29 percent) would be recommended for withdrawal from the planning area. If the lands recommended are formally withdrawn, the location of new mining claims would be forbidden. Exploration and mining would be restricted to existing valid mining claims. This alternative would restrict locatable mineral development and could cause future proposed projects to be rejected, withdrawn, or closed.

Land uses associated with lands and realty actions would continue under current policies and regulations. Impacts from land and realty management actions would be similar to those discussed above under general impacts.

Socioeconomic cumulative impacts would be similar to those discussed above under general impacts. The additional cost for validity exams for existing mining claims would also impact locatable minerals and could cause companies and workforce to explore mineral developments outside of the planning area. Cumulative impacts on locatable minerals would increase under this alternative since additional lands are recommended for withdrawal from locatable mineral entry and increased costs due to possible validity exams may deter locatable mineral development within the planning area. Alternative C is the most restrictive alternative for locatable minerals and could cause exploration and mining projects to be rejected, withdrawn, or closed. Alternative C has the greatest impact of all other alternatives to locatable minerals.

Alternative D

Under Alternative D, conservation, maintenance, and enhancement of PHMA while managing locatable mineral development is emphasized and no additional acreage is recommended for withdrawal. Alternative D has similar impacts on Alternative A. However, the impacts under this alternative would be more restrictive to locatable mineral development due to an emphasis on achieving a net conservation gain of GRSG habitat and by applying RDFs consistent with applicable law to plans of operations or providing for the enhancement of GRSG habitat through off-site mitigation. Claimants and operators would also be encouraged to consolidate exploration activities into plans of operations to reduce proliferation of discrete exploration notices under 43 CFR 3809.21(b).

Land uses associated with lands and realty actions would continue under current policies and regulations. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Cumulative impacts on locatable minerals would increase under this alternative since additional costs for the conservation, maintenance, and enhancement of GRSG habitats may be cost prohibitive and could cause operators and workforce to develop locatable mineral projects outside of the planning area. Impacts would be greater than Alternative A, and similar to Alternative E. Impacts would be less than Alternative B, C, F and the Proposed Plan. This alternative is more

restrictive than Alternative A and could cause some of the cases to be withdrawn or closed.

The 3 percent cumulative disturbance cap would also impact future locatable mineral development. If activities on federal, state, private or other lands were to reach the disturbance cap in PHMA, then no additional disturbance, except new locatable mineral activity, would be allowed. Federal mineral estate would be required to incorporate mitigation measures to avoid further surface disturbance.

Alternative E

Alternative E proposes to reduce the affect to GRSG habitat (core, priority, and general habitat) by the application of avoid, minimize, and mitigate strategies with the addition of the Conservation Credit System managed by the State of Nevada. This alternative would have similar restrictions as Alternative A but would require consultation with the SETT to provide consistent evaluation, reconciliation, and guidance for project development to avoid, minimize or mitigate disturbances to GRSG habitats. Alternative E also includes the application of RDFs consistent with applicable law which are additional conservation measures for the protection of GRSG and its habitat. The RDFs consistent with applicable law would be applied to all GRSG habitat within the SGMA. Locatable mineral operators may experience increased costs and project permitting delays. The additional cost and time for consultation with the SETT and the Conservation Credit System would impact locatable minerals and could cause companies and workforce to explore mineral developments outside of the planning area.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Impacts would be greater than Alternative A, and similar to Alternative D. Impacts would be less than Alternative B, C, F and the Proposed Plan. This alternative is more restrictive than Alternative A and could cause some of the cases to be withdrawn or closed.

Alternative F

Management under Alternative F would result in cumulative impacts similar to Alternative B.

Proposed Plan

Under the Proposed Plan, an additional 2,797,400 acres (5 percent) designated as SFAs would be recommended for withdrawal within the planning area. The alternative includes a net conservation gain and a goal not to exceed a 3 percent disturbance for discretionary anthropogenic activities subject to valid existing rights. For Nevada, in specific instances, there can be an exceedance of the 3 percent disturbance cap if the project approval results in a net conservation gain for GRSG (see Action SSS-2). The three percent disturbance cap could constrain other resource uses from being developed if it resulted in reaching the

disturbance cap. The Proposed Plan includes the application of RDFs consistent with applicable law for locatable mineral development which are conservation measures for the protection of GRSG and its habitat. The RDFs for locatable mineral development would be applied to all GRSG habitat consistent with applicable law.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Management under the Proposed Plan would result in less cumulative impacts on the locatable minerals program than Alternatives B, C and F due to less acreage recommended for withdrawal and the lack of active mines within SFAs.

Socioeconomic cumulative impacts would be similar to those discussed above under general impacts. Existing mining claims in areas withdrawn from locatable mineral entry would have to undergo a validity exam, resulting in increased up-front costs of locatable mineral development and would delay the start of development on those claims. Cumulative impacts on locatable minerals would increase under this alternative since additional lands are recommended for withdrawal from locatable mineral entry and increased costs due to possible validity exams may deter locatable mineral development within the planning area. Impacts would be greater than Alternative A, D, and E due to the increased amount of recommended lands for withdrawal and the implementation of the Nevada Conservation Credit System under the Proposed Plan. Impacts would be less than Alternative B, C and F since the recommended withdrawal of lands in SFAs and the acreage recommended for withdrawal is less.

5.14.3 Mineral Materials

The cumulative impact analysis area for impacts from proposed management actions on salable minerals includes lands within the planning area.

The past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect salable minerals are: lands and realty actions and socioeconomics.

Cumulative impacts on salable minerals include a reduction in the number of submitted lands and realty actions, due to exclusions and avoidances for ROWs in sage grouse habitat for all alternatives except Alternative A, resulting in a decrease in the ability to develop economically feasible production of mineral resources. The nature and type of cumulative socioeconomic impacts depends on such variables as market fluctuation in demand for mineral resources, available markets for distribution, and conservation measures to protect GRSG habitat. Salable minerals are used for all forms of development and are often associated with the construction and maintenance of lands and realty actions. As discussed in Chapter 4, with the closure of acreage to conserve GRSG habitat, access roads to existing and new salable mineral projects would be lost,

rendering the project economically infeasible to develop. Given that the mineral materials program is a discretionary program by the BLM and Forest Service, mineral development would be expected to continue to occur under all alternatives.

The following cumulative effects analysis for each of the alternatives examines relative differences in impacts on salable minerals within the planning area for the life of the LUP (i.e., approximately 20 years). Salable minerals do not have associated timeframes with authorizations because of the dependency on market fluctuation and demand.

Alternative A

Under Alternative A, 6,201,500 acres (11 percent) of federal mineral materials would remain closed from development in the planning area. No additional acreage is recommended for withdrawal within the planning area under this alternative. Mineral material development, including all associated lands and realty actions, would be implemented within the planning area (see **Table 5-39**). There would be no significant socioeconomic cumulative impacts on mineral materials under this alternative since a large percentage of the planning area would be open to mineral material development and no additional restrictions would be applied to mining operations. This alternative would have the least restrictions on salable mineral development within the planning area.

Table 5-47 shows the total acreage closed, recommended for closure, and open to mineral material development.

Table 5-47
Mineral Materials Allocations (Acres) by Alternative

Alternative	Closed to Mineral Material Development	Recommended for Closure to Mineral Material Development	Open to Mineral Material Development
Alternatives A and E	6,201,500		48,877,400
Alternatives B and F	6,201,500	8,236,400	40,641,000
Alternative C and D	6,201,500	14,642,300	34,235,100
Proposed Plan	6,201,500	9,255,400	39,622,000

Source: BLM and Forest Service GIS 2014

Alternative B

Under Alternative B, an additional 8,236,400 acres (15 percent) would be recommended for closure to mineral materials development in the planning area. Under Alternative B, the 8,236,400 acres recommended for closure from salable minerals would restrict mineral development. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Where lands recommended for closure from mineral material

development within the planning area would occur, impacts on salable minerals in the form of a reduction in the ability to develop mineral resources to provide material for existing and new community infrastructure, mining, and other industry development would increase. Cumulative impacts on salable minerals would increase under this alternative since additional lands are recommended for closure from salable mineral entry within the planning area. Impacts would be greater than Alternative A, and E, but less than Alternative C, D, F, and the Proposed Plan. This alternative would be more restrictive than Alternative A and E and could cause existing and new salable mineral projects to be withdrawn, rejected, or closed.

Alternative C

Under Alternative C, an additional 14,642,300 acres (27 percent) would be recommended for closure to mineral materials development. Under Alternative C, the 14,642,300 acres recommended for closure from salable minerals would restrict mineral development. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Where lands recommended for closure from mineral material development within the planning area would occur, impacts on salable minerals in the form of a reduction in the ability to develop mineral resources to provide material for existing and new community infrastructure, mining, and other industry development would increase. Cumulative impacts on salable minerals would increase under this alternative since additional lands are recommended for closure from salable mineral entry within the planning area. Alternative C is the most restrictive alternative for salable minerals since all PHMA would be closed to mineral development. Closures in PHMA could cause mineral material development projects to be rejected, withdrawn, or closed. Alternative C has the greatest impact of all other alternatives to salable minerals.

Alternative D

Under Alternative D, an additional 14,642,300 acres (27 percent) would be recommended for closure to mineral materials development. The impacts on mineral material development would be the same as those described under Alternative C with the exception of reasonable access opportunities that would be provided to the Federal Highway Administration, NDOT, Caltrans, counties, and the public for existing mineral material pits in PHMA and GHMA.

The 3 percent disturbance cap would also impact future mineral material sales. If activities on federal, state, private or other lands were to reach the disturbance cap in PHMA, then no additional disturbance, including new or expansion of existing mineral material sites, would be allowed.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Where lands recommended for closure from mineral material development within the planning area would occur, impacts on salable minerals in the form of a reduction in the ability to develop

mineral resources to provide material for existing and new community infrastructure, mining, and other industry development would increase. This alternative emphasizes conservation, maintenance, or enhancement of PHMA while managing mineral material development. Loss of GRSG habitat through disturbance at current sites would be offset through mitigation. Cumulative impacts on salable minerals would increase under this alternative since additional lands are recommended for closure from salable mineral entry within the planning area, except for the opportunities listed above. Impacts would be greater than Alternative A, B, E, F, and the Proposed Plan, but less than Alternative C. This alternative would be more restrictive than all other alternatives, except Alternative C, and could cause existing and new salable mineral projects to be withdrawn, rejected, or closed.

Alternative E

Under Alternative E, 6,201,500 acres (11 percent) of federal mineral materials would remain closed from development in the planning area. No additional acreage is recommended for withdrawal within the planning area under this alternative. This alternative would have similar restrictions as Alternative A but would require consultation with the SETT to provide consistent evaluation, reconciliation, and guidance for project development to avoid, minimize or mitigate disturbances to GRSG habitats and be subject to the Nevada Conservation Credit System. Alternative E also includes the application of RDFs consistent with applicable law, which are additional conservation measures for the protection of GRSG. The RDFs would be applied to all GRSG habitat, including core, priority, and general within the SGMA consistent with applicable law. Terms and conditions would be incorporated into permits and adjusted as needed through monitoring and adaptive management to meet GRSG habitat objectives. Salable mineral operators may experience increased costs and project permitting delays to get their projects approved. The additional cost and time for consultation with the SETT and the Conservation Credit System would impact salable minerals and could cause companies and workforce to explore mineral developments outside of the planning area.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Impacts would be greater than Alternative A, and similar to Alternative D. Impacts would be less than Alternative B, C, F and the Proposed Plan. This alternative is more restrictive than Alternative A and could cause some of the mineral development projects to be withdrawn or closed.

Alternative F

Management under Alternative F would result in the same level and types of cumulative impacts as Alternative B.

Proposed Plan

Under the Proposed Plan, an additional 9,255,400 acres (17 percent) associated with SFAs would be recommended for closure to salable mineral development within the planning area. PHMA would be closed to salable mineral development. The Proposed Plan includes the application of RDFs consistent with applicable law which are additional conservation measures for the protection of GRSg. Terms and conditions would be incorporated into permits and adjusted as needed through monitoring and adaptive management to meet GRSg habitat objectives. This alternative would subject any anthropogenic disturbance within GRSg habitat to a net conservation gain of GRSg habitat and apply a 3 percent disturbance cap in PHMA. The 3 percent cumulative disturbance cap would also impact future mineral materials disposal if activities on federal, state, private or other lands where the disturbance cap is reached in PHMA. If reached, additional disturbance, including those associated with proposed new or expanded mineral materials sites, would not be allowed.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Socioeconomic cumulative impacts represent an impact on the potential discovery, development, and use of those resources by decreasing the availability of those mineral resources. Existing and proposed mineral material projects within areas closed from salable mineral development would be subject to additional costs associated with RDFs (consistent with applicable law) and disturbance caps in PHMA, resulting in increased up-front costs of salable mineral development and would delay the start of development. Cumulative impacts on salable minerals would increase under this alternative since additional lands are recommended for closure to salable minerals and lands and realty actions, which may deter mineral developments within the planning area. Impacts would be greater than Alternatives A, B, E, and F due to the increased amount of recommended lands for closure, the implementation of RDFs consistent with applicable law and the disturbance cap. Impacts would be less than Alternatives C and D since the recommended closure of lands is less and the lack of active existing minerals development within SFAs.

5.14.4 Solid (Nonenergy) Leasable Minerals

The cumulative impact analysis area for impacts from proposed management actions on nonenergy leasable minerals includes lands within the planning area.

The past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect nonenergy leasable minerals are: lands and realty actions and socioeconomics.

Cumulative impacts on nonenergy leasable minerals include a reduction in the number of submitted lands and realty actions, due to exclusions and avoidances for ROWs in GRSg habitat for all alternatives except Alternative A, resulting in a decrease in the ability to develop economically feasible production of mineral

resources. The nature and type of cumulative socioeconomic impacts depends on such variables as market fluctuation in demand for mineral resources, available markets for distribution, and conservation measures to protect GRSG habitat. As discussed in Chapter 4, with the closure of acreage to conserve GRSG habitat, access roads to existing and new nonenergy leasable mineral projects would be lost, rendering the project economically infeasible to develop. Given that the nonenergy leasable minerals program is a discretionary program by the BLM and Forest Service, mineral development would be expected to continue to occur under all alternatives.

The following cumulative effects analysis for each of the alternatives examines relative differences in impacts on nonenergy leasable minerals within the planning area for the life of the LUP (i.e., approximately 20 years). Nonenergy leasable minerals do not have associated timeframes with authorizations because of the dependency on market fluctuation in demand.

Alternative A

Under Alternative A, 6,201,500 acres (11 percent) of federal nonenergy leasable minerals would remain closed to leasing in the planning area. No additional acreage is recommended for withdrawal within the planning area under this alternative. Nonenergy leasable mineral development, including all associated lands and realty actions, have and would be implemented within the planning area (see **Table 5-39**). There would be no significant socioeconomic cumulative impacts on nonenergy leasable minerals under this alternative since a large percentage of the planning area would be open to leasing and development and no additional restrictions would be applied to operations. This alternative would have the least amount of restrictions on nonenergy leasable mineral development within the planning area.

Table 5-48 shows the total acreage closed, recommended for closure, and open to nonenergy leasable minerals development.

Table 5-48
Nonenergy Leasable Mineral Allocations (Acres) by Alternative

Alternative	Closed to Nonenergy Leasable Minerals Leasing	Recommended for Closure to Nonenergy Leasable Mineral Leasing	Open to Nonenergy Leasable Mineral Leasing
Alternatives A and E	6,201,500	0	48,877,400
Alternatives B and F	6,201,500	8,236,400	40,641,000
Alternative C and D	6,201,500	14,642,300	34,235,100
Proposed Plan	6,201,500	9,255,400	39,622,000

Source: BLM and Forest Service GIS 2014

There are 41 pending prospect permits for nonenergy leasable minerals within the planning area. This alternative would have the least amount of restrictions on these pending cases.

Alternative B

Under Alternative B, an additional 8,236,400 acres (15 percent) would be recommended for closure to nonenergy leasable mineral leasing in the planning area. Under Alternative B, the 9,342,600 acres recommended for closure from nonenergy leasable minerals would restrict development. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Where lands recommended for closure from leasing and development within the planning area would occur, impacts on nonenergy leasable minerals in the form of a reduction in the ability to develop mineral resources would increase. Cumulative impacts on nonenergy leasable minerals would increase under this alternative since additional lands are recommended for closure from leasing within the planning area. Impacts would be greater than Alternative A, and E, but less than Alternative C, D, F, and the Proposed Plan. This alternative would be more restrictive than Alternative A and E and could cause existing and new nonenergy leasable mineral projects to be withdrawn, rejected, or closed.

There are 41 pending prospect permits for nonenergy leasable minerals within the planning area. This alternative would place restrictions on 11 of these pending cases that could cause them to be withdrawn, rejected, or closed.

Alternative C

Under Alternative C, an additional 14,642,300 acres (27 percent) would be recommended for closure to nonenergy leasable mineral leasing within the planning area. Under Alternative C, the 14,642,300 acres recommended for closure from nonenergy leasable minerals would restrict mineral development. Impacts from land and realty management actions would be similar to those discussed above under general impacts. Where lands recommended for closure from nonenergy leasable mineral development within the planning area would occur, impacts on nonenergy leasable minerals in the form of a reduction in the ability to develop mineral resources would increase. Cumulative impacts on nonenergy leasable minerals would increase under this alternative since additional lands are recommended for closure from leasing and development within the planning area. Alternative C is the most restrictive alternative for nonenergy leasable minerals since all PHMA would be closed to mineral development, which could cause nonenergy leasable mineral projects to be rejected, withdrawn, or closed. Alternative C has the greatest impact of all other alternatives to nonenergy leasable minerals.

There are 41 pending prospect permits for nonenergy leasable minerals within the planning area. This alternative would place restrictions on 11 of these pending cases that could cause them to be withdrawn, rejected, or closed.

Alternative D

Under Alternative D, an additional 14,642,300 acres (27 percent) would be recommended for closure to nonenergy leasable mineral leasing. This alternative emphasizes conservation, maintenance, or enhancement of PHMA while managing mineral material development. Loss of GRSG habitat through disturbance at current sites would be offset through the avoid, minimize or mitigate process. Cumulative impacts on nonenergy leasable minerals would increase under this alternative since additional lands are recommended for closure from leasing and development within the planning area. The cumulative impacts on nonenergy leasable mineral development would be the same as those described under Alternative C which could cause existing and new salable mineral projects to be withdrawn, rejected, or closed.

The 3 percent disturbance cap would also impact future solid nonenergy leasable material development. If activities on federal, state, private or other lands were to reach the disturbance cap within PHMA, then no additional disturbance, including new or expansion of existing solid leasable sites would be allowed.

Alternative E

Under Alternative E, 6,201,500 acres (11 percent) of federal mineral materials would remain closed to nonenergy leasable mineral leasing in the planning area. No additional acreage is recommended for closure within the planning area under this alternative. This alternative would have similar restrictions as Alternative A but would require consultation with the SETT to provide consistent evaluation, reconciliation, and guidance for project development to avoid, minimize or mitigate disturbances to GRSG habitats and be subject to the Nevada Conservation Credit System. Alternative E also includes the application of RDFs consistent with applicable law which are additional conservation measures for the protection of GRSG. The RDFs would be applied to all GRSG habitat, including core, priority, and general within the SGMA (consistent with applicable law). Terms and conditions would be incorporated into permits and adjusted as needed through monitoring and adaptive management to meet GRSG habitat objectives. Nonenergy leasable mineral operators may experience increased costs and project permitting delays to get their projects approved. The additional cost and time for consultation with the SETT and the Conservation Credit System would impact nonenergy leasable minerals and could cause companies and workforce to explore mineral developments outside of the planning area.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Impacts would be greater than Alternative A, and similar to Alternative D. Impacts would be less than Alternative B, C, F and the Proposed Plan. This alternative is more restrictive than Alternative A and could cause some of the nonenergy leasable mineral

projects to be withdrawn or closed. There are 41 pending prospect permits for nonenergy leasable minerals within the planning area.

Alternative F

Management under Alternative F would result in cumulative impacts similar to Alternative B.

Proposed Plan

Under the Proposed Plan, an additional 9,255,400 acres (17 percent) associated with SFAs would be recommended for closure to nonenergy leasable mineral leasing within the planning area. Expansion of existing leases would be considered in PHMA outside of SFAs. The Proposed Plan includes the application of RDFs consistent with applicable law which are additional conservation measures for the protection of GRSG. Terms and conditions would be incorporated into permits and adjusted as needed through monitoring and adaptive management to meet GRSG habitat objectives. This alternative would subject anthropogenic disturbances within GRSG habitat to a net conservation gain of GRSG habitat and apply a 3 percent disturbance cap in PHMA.

The 3 percent disturbance cap would also impact future solid nonenergy leasable mineral development if activities on federal, state, private or other lands where the disturbance cap is reached within PHMA. Additional disturbances, including solid nonenergy mineral development would not be allowed.

Impacts from land and realty management actions would be similar to those discussed above under general impacts. Socioeconomic cumulative impacts represent an impact on the potential discovery, development, and use of those resources by decreasing the availability of those mineral resources. Existing and proposed mineral material projects within areas closed to nonenergy leasable mineral leasing and development would be subject to additional costs associated with RDFs (consistent with applicable law) and disturbance caps in PHMA, resulting in increased up-front costs of nonenergy leasable mineral projects and would delay the start of development. Cumulative impacts on nonenergy leasable minerals would increase under this alternative since additional lands are recommended for closure to nonenergy leasable mineral leasing and lands and realty actions, which may deter mineral developments within the planning area. Impacts would be greater than Alternatives A, B, E, and F due to the increased amount of recommended lands for closure and the implementation of RDFs consistent with applicable law and disturbance caps. Impacts would be less than Alternatives C and D since the recommended closure of lands is less and lack of active existing minerals development within SFAs.

There are 41 pending prospect permits for nonenergy leasable minerals within the planning area. This alternative would place restrictions on 11 of these pending cases that could cause them to be withdrawn, rejected, or closed.

5.15 SPECIAL DESIGNATIONS – AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect ACECs are management decisions which are specific to restoring GRSG habitat, as opposed to management decisions which would maintain existing habitat.

Alternatives Analysis

Under alternatives B, D, E and F, GRSG management actions would potentially enhance the management in 22 to 29 existing ACECs, depending on the alternative. This would be beneficial to those ACECs Relevance and Importance values.

Alternatives C and F would increase the amount of acreage currently under ACEC management through the addition of 18 ACECs (9,573,300 acres) in Alternative C and 9 ACECs (848,400 acres) in Alternative F. The management decisions in these two alternatives would not decrease the amount of protection currently provided by existing ACEC management, but in some cases would provide beneficial and supportive measures in the long term to existing ACECs which contain GRSG habitat.

Reasonably foreseeable trends that would result in cumulative impacts on some existing ACECs would include moderate- to large-scale changes in vegetative cover, e.g., from pinyon and/or juniper woodland to sagebrush steppe. This may allow for potential wildfire impacts from invasive plant species which can provide fine fuels to propel large scale fires through ACECs with vegetative and/or cultural Relevance and Importance values. Most existing ACECs are currently managed as exclusion or avoidance to ROWs and are managed as NSO or closed to leasing. These resources would not influence potential changes to vegetative cover.

5.16 WATER RESOURCES

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and would likely continue to affect water resources are fluid, locatable and salable mineral development, lands and realty actions, livestock grazing, wild horse and burro management, travel and transportation, fire, range improvements, vegetation management, drought and climate change.

Mineral development (fluid, locatable and salable) would continue to impact water resources in the planning area. These activities could impact water resources through an increase in the presence of petroleum-using vehicles and equipment and soil disturbance which increases the likelihood of chemical spills, leaching, erosion, and contamination of waterways. Mineral Impacts on groundwater aquifers due to leasable development can result in reduction of reservoir pressures in geothermal development or aquifer contamination due to poor well construction in oil and gas development. Locatable mineral

development can result in dewatering which would cause lowering water tables and could impact connected surface waters. Vegetation management is important for soil stability as vegetation anchors soils in place and prevents excessive erosion and runoff into waterways. Vegetation management includes fuels reduction through prescribed fires, chemical and mechanical treatments, and seeding. Active vegetation management should contribute to the stabilization and protection of soils in these areas from erosion and subsequent runoff contributing to higher pollutant and sediment loads to waterways.

Existing, proposed, and foreseeable ROW development in the planning area would also result in cumulative impacts on water resources through human-made runoff of soils and chemicals into waterways. Short-term impacts from construction would be greater than long-term impacts if sites are well mitigated. The development allowed under these authorizations would result in surface-disturbance, which would generally contribute to a decrease in water quality through compaction, erosion, and sediment runoff into waterways as well as an increase in the potential for chemical contamination.

Wildland fire impacts on water resources are typically dependent on the size and severity of the fire. Fire removes vegetation cover and exposes soils to erosion, increasing the potential for sediments to be transported into waterways. Additionally, high severity fires can cause hydrophobic soils, causing more water to runoff and reducing infiltration, increasing erosion and flooding rates to waterways. These impacts can be short-term or long-term depending on the severity of the fire and restoration of the area. Fire suppression activities can result in increased soil disturbance, making more soil available to erosion; however, these impacts are typically short-term and less severe than impacts of a high severity wildfires.

Grazing by livestock and wild horses and burros can affect water resources through the trampling of soils and vegetation along and within natural water features and through the formation of fecal coliform and nutrients in waterways. Livestock grazing is associated with range management, which involves constructing infrastructure in order to support livestock grazing. Proposed rangeland improvement projects are on-going and the most common ones include water developments and fencing. These types of actions could cumulatively impact waters through compaction and erosion of soils during construction (short-term impact) and through modification of water sources and riparian habitats and subsequent runoff into waterways, which can have both short-term and long-term impacts depending on project specifics.

Drought affects the health of rangeland, riparian areas, and forests, making them more susceptible to the invasion of weeds and wildfire. Fire can impact water resources in the short term through the removal of vegetation resulting in instability of soils and increased erosion and sediment into waterways. Long-term effects of fire are considered beneficial as the landscape can be returned to

a healthier state with proper seeding and management, which would indirectly reduce the risk of fire and reduce erosion of soils into waterways. Climate change would also pose a long-term threat of cumulative impacts on water resources. Cumulative impacts from climate change on GRSG habitat and consequently water resources, could include overall reduction of water availability throughout the planning area, vegetation regime changes (e.g., from sagebrush to grasslands), increased wildfire potential due to drought, changes in precipitation timing and severity; increasing pressures on rural water resources for urban development and increased sedimentation and erosion into waterways (Connelly et al. 2004).

5.16.1 Alternatives Analysis

Alternative A

Under Alternative A, the BLM and Forest Service would continue to allow ROWs, mineral development, and grazing, based on existing management plans, throughout the planning area with the result of continued cumulative impacts on water resources similar to those currently occurring.

Alternative B

Alternative B would include limitations on surface-disturbing activities, such as ROW development and mineral development which could reduce the potential for long-term cumulative impacts on water resources. Livestock grazing would be limited in PHMA unless it enhances GRSG habitat which would allow for treatments and management improvements that would decrease erosion potential and impacts on water quality in the long term. Fire management activities identified RDFs consistent with applicable law for suppression and fuel treatments. Overall reduction in wildfire potential could reduce impacts on water resources.

Alternative C

When considered in conjunction with other non-BLM/Forest Service actions and compared with the other alternatives, management under Alternative C would result in the least amount of cumulative impacts on water resources due to proposed management prescriptions that include the designation of PHMA as ROW exclusion, removal of livestock grazing in GRSG habitat, and closure or application of lease stipulations to mineral development in PHMA. Impacts from wildland fire would be the same as Alternative A, but the overall net effect from could be beneficial to water resources in the long term.

Alternative D

Alternative D would include limitations on surface-disturbing activities, such as ROW development and mineral development which could reduce the potential for long-term cumulative impacts on water resources. It also includes several actions for livestock grazing management which would improve water quality within the planning area. Fire management identified RDFs consistent with

applicable law for suppression and fuel treatments. Overall reduction in wildfire potential could reduce impacts on water resources.

Alternative E

Alternative E outlines a strategy for managing GRSG habitat. This strategy includes the requirement of a net conservation gain and the requirement to avoid, minimize and mitigate impacts by project activities. All actions throughout the planning area would provide an overall benefit to water resources within core, priority and general GRSG habitat. The Nevada Conservation Credit System should provide for more limited surface disturbance and the ability to restore impacted lands, which could result in reduced impacts on water quality and quantity in GRSG habitat.

Alternative F

Alternative F would include limitations on surface-disturbing activities, such as a 3 percent cap on ROW and renewable energy development, a 25 percent reduction in AMLs for wild horse and burro and livestock grazing management in PHMA, fewer travel and transportation activities and mineral development, reducing the potential for long-term cumulative impacts on water resources.

Proposed Plan

The Proposed Plan would include limitations on surface-disturbing activities, such as ROW development and mineral development which could reduce the potential for long-term cumulative impacts on water resources. It also includes several actions for livestock grazing management which would improve water quality within the planning area. The Proposed Plan would be similar to Alternative D.

5.17 TRIBAL INTERESTS (INCLUDING NATIVE AMERICAN RELIGIOUS CONCERNS)

The cumulative impact analysis area used to analyze cumulative impacts on tribal interests consists of PHMA and GHMA.

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect tribal interests are similar to those described above in Chapter 4. These include proposed mine expansions for locatable minerals, transmission lines, fuels reduction projects, habitat restoration projects, renewable energy projects, and WHB Management. These projects could decrease the opportunities for tribes to continue valued traditional cultural practices depending upon whether they cause GRSG populations to stabilize, increase, or decrease in the future. Implementing the goals and strategies described in the proposed alternative to these future projects; however, would be expected to increase tribal opportunities to continue specific traditional practices such as observing lekking behavior. Nevertheless, fuels reduction projects that remove or thin pinyon and/or juniper trees could decrease tribal opportunities to use these resources in their traditional cultural practices.

5.17.1 Alternatives Analysis

All of the action alternatives propose some degree of management goals and objectives to help maintain the future survival of GRSG populations and habitats in the planning area. Implementing these protective measures could increase tribal opportunities to continue valued traditional cultural practices such as observing lekking behavior because GRSG would continue to be present into the future. Alternatives that limit earth disturbance within or near GRSG habitat, or that result in a net conservation gain of GRSG habitat, would be expected to benefit tribal traditional practices into the future. In addition, site-specific habitat restoration projects would be subjected to NEPA analysis and additional tribal consultation to take into account tribal concerns.

5.18 CLIMATE CHANGE

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have contributed greenhouse gases to the atmosphere include mineral development, wildfire, and fuel combustion. There can also be more short-term contributions to greenhouse gas emissions from lands and realty management and renewable energy development, due to initial construction activities.

Mineral development has occurred, is occurring, and will continue to occur on both federal and nonfederal mineral estate lands within the planning area. Mineral development results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment. Closing and withdrawing more areas to mineral development would result in and overall decrease to GHG emissions associated with these actions on BLM-administered lands. While GHG emissions would likely be reduced, restricting mineral development on federally administered lands could shift development to non-federal lands. or would require longer travel times to and from mining areas either negating potential reductions in GHG emissions or increasing GHG emissions.

Fires, particularly uncontrolled fires, can emit large quantities of GHGs into the atmosphere, including carbon dioxide, methane, and nitrous oxide (EPA 2012h, pp. 7-21 - 7-22). Fires also remove vegetation that act as carbon sinks.

Climate change may also impact local vegetation communities and distributions. The redistribution and changes to vegetation communities could result in additional carbon released into the atmosphere or result in more carbon taken up in a sink. As climates alter, some vegetation communities may not be able to adapt as quickly resulting in redistributions of communities. Additionally, surface-disturbing activities could exacerbate this effect, opening up areas to more adaptable invasive species and making reestablishment by native communities more difficult.

5.18.1 Alternatives Analysis

Alternative A

Cumulative impacts under Alternative A would be the same as those resulting from current management activities and there would be no change to GHG emissions.

Alternative B

Under Alternative B, cumulative impacts on climate change would result in overall reductions in GHG emissions. Conservation of PHMA and GHMA and closing areas of high potential to fluid mineral leasing and development would reduce anthropogenic disturbances and potential for GHG emissions.

Alternative C

Alternative C is the most restrictive of all of the alternatives and generally constrains all resource use. Restoration activities, such as vegetation management treatments, would be more passive in nature, which may or may not be successful with altering climates. This could result in an overall reduction in GHG emissions within the planning area.

Alternative D

Alternative D generally constrains resource use and requires NSO stipulations in PHMA for currently unleased areas and conservation measures for reducing land disturbance on leased areas. This could result in a decrease of GHG emissions overall within the planning area. This alternative also restricts the amount of vegetation that can be burned in a prescribed burn, or that can be allowed to burn in an unplanned natural ignition and implement fuels treatments which maintain sagebrush canopy cover and existing sagebrush ecosystems. Additionally, post-fire treatments would be designed and implemented with an emphasis on restoring existing sagebrush ecosystems damaged by fire and control invasive species.

Alternative E

Alternative E outlines a strategy for managing GRS habitat. This strategy includes the requirement of a net conservation gain and the requirement to avoid, minimize and mitigate impacts by project activities. Although this strategy may help reduce impacts on GRS habitat, it will not necessarily result in fewer GHG emissions due to activities such as mineral development and realty actions. The planned Conservation Credit System should provide for more limited surface disturbance and ability to restore impacted lands, which could result in reduced impacts on climate change in GRS habitat.

Alternative F

Alternative F would include limitations on surface-disturbing activities, such as a 3 percent cap on ROW and renewable energy development, a 25 percent reduction in AMLs for wild horse and burro and livestock grazing management

in GRSG habitat, fewer mineral development. This could result in an overall decrease of GHG emissions within the planning area.

Proposed Plan

The Proposed Plan would include limitations on surface-disturbing activities, such as ROW development and mineral development which could reduce the potential for long-term cumulative impacts on climate change. It also includes several actions for vegetation management which could reduce invasive weed populations and improve vegetation resiliency to climate change within the planning area. The Proposed Plan would be similar to Alternative D.

5.19 SOCIAL AND ECONOMIC IMPACTS (INCLUDING ENVIRONMENTAL JUSTICE)

Past, present, and reasonably foreseeable future actions and conditions within the cumulative impact analysis area that have affected and will likely continue to affect social and economic conditions are chiefly mining and mineral exploration and development, lands and realty, travel and transportation management, renewable energy development, recreation, and livestock grazing, including most of those reasonably foreseeable projects listed in **Table 5-39**.

The cumulative impact analysis area used to analyze potential impacts on social and economic conditions consists of the counties identified as the socioeconomic study area.

Changes to social and economic conditions result when individuals, businesses, governments, and other organizations initiate actions. Millions of decisions will be made by thousands of residents of the counties in the socioeconomic study area, and others, over the next several decades, which will affect trends in employment, income, housing, and property. Projections published by the Research and Analysis Bureau of the Nevada Department of Employment, Training, and Rehabilitation, and the Employment Development Department of California, account for these individual decisions in the aggregate, and provide a baseline for comparing effects of alternatives in the future. The projections represent a regional forecast taking a wide range of actions into account – management actions by the BLM and Forest Service as well as many other government entities, private citizens, and businesses. As a result, they incorporate the past, present, and reasonably foreseeable future projects that will form the basis of future economic and social trends in the cumulative impact analysis area. Current and future trends in the cumulative impact analysis area include population growth, changes in mining activity, including gold, silver, copper and other locatable and salable minerals as well as exploration for hydrocarbons; renewable energy development, especially geothermal and wind energy; changing recreational demands; livestock grazing; ROWs and other activities, as noted in **Section 4.21**, Socioeconomics and Environmental Justice.

Some of the predicted employment and income effects of the actions considered in this Final EIS were able to be quantified, and where possible, BLM and Forest Service used IMPLAN, a regional economic model, to calculate

indirect and induced impacts of these actions. **Table 5-49** shows projected employment for approximately 2020, as forecast by Nevada and California state agencies. Because Alternative A represents current management plans, employment would correspond most closely to the existing forecasts. By contrast, employment under Alternatives B through F and the Proposed Plan would be expected to change from the projections, with the best estimate for those changes being the quantities shown in **Chapter 4, Environmental Consequences**. Thus, **Table 5-49** shows the estimated change in employment for these alternatives, based on modifying the projected future employment by the estimated changes for the socioeconomic study area (from IMPLAN). The Nevada and California state agencies do not provide projections for labor income or output.

Table 5-49
Projected Employment by Alternative for Socioeconomic Study Area

Item	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Proposed Plan
Employment (2010) ¹	287,953	287,953	287,953	287,953	287,953	287,953	287,953
Average annual change in future employment related to grazing ²	N/A	0	-2,388	0	0	-1,272	0
Average annual change in future employment related to geothermal development ³	N/A	-66	-111	-90	55	-111	-98
Average annual change in future employment related to oil development ³	N/A	-72	-138	-122	-39	-138	-128
Average annual change in future employment related to wind energy development ³	N/A	-267	-267	-267	-267	-267	-267
Overall change in 2018-2020 employment	N/A	-405	-2,904	-479	-94	-1,788	-493
Projected 2018-2020 employment ⁴	316,672	316,267	313,768	316,193	316,578	314,884	316,179
% change, 2010 to 2018-2020	9.97%	9.83%	8.97%	9.81%	9.94%	9.35%	9.80%
Percentage point difference relative to Alt. A	0	-0.14	-1.01	-0.17	-0.03	-0.62	-0.17

Source: Nevada Department of Employment, Training, and Rehabilitation (2013a, 2013b, 2013c), and Employment Development Department of California (2013) (projected employment data), modified by estimates from IMPLAN reported in **Section 4.20, Socioeconomics and Environmental Justice**. Changes related to specific sectors include direct, indirect, and induced effects from IMPLAN; see **Appendix T, Detailed Employment and Earnings Data**, for a detailed description of this model.

¹ The source of 2010 employment data used in this table differs from that used in **Section 3.22, Socioeconomics and Environmental Justice**, so there may be differences between the estimates shown.

² The values for livestock grazing represent the midpoint of the low and high scenarios described in **Section 4.20, Socioeconomics and Environmental Justice**.

³ The values for geothermal, wind energy, and oil and gas reflect employment during both construction and operations.

⁴ Due to inconsistent projection years in the underlying data, projected 2018-2020 employment is calculated from 2020 projections for Churchill and Washoe Counties, and 2018 projections for the remaining counties. Where the underlying data sources do not provide county-level employment projections, they were imputed based on the county shares of current employment.

Changes in employment, especially in Alternatives C and F, would have a measurable although relatively small effect on future employment, according to this analysis. Employment changes related to livestock grazing – including sectors that support and are supported by grazing – account for the majority of this effect in both Alternative C and Alternative F. Employment changes from geothermal, wind energy development, and oil and gas related industries would also play a role. Based on 2010 employment data by industry presented in **Section 3.22**, the differences in livestock grazing related employment among alternatives would represent an important share of farming sector employment. The differences in mining employment by alternative (only geothermal and oil and gas) would represent a very small share of mining related employment¹. In Alternatives A, B, D, E, and the Proposed Plan employment would increase by 9.8 percent to 10 percent. These reductions would not likely be noticeable given the size of the study area and the uncertainty associated with a long-term forecast. In Alternatives C and F, employment would be projected to increase by somewhat less: 8.9 percent in Alternative C, and 9.3 percent in Alternative F. Although these reductions would be noticeable, they would also be relatively modest given the size of the study area and the uncertainty inherent in long-term forecasting.

Of the effects documented in **Section 4.20**, Socioeconomics and Environmental Justice, the impact that most exacerbates current economic challenges is the potential for several of the management alternatives to result in increased costs for livestock grazing operators. Long-term trends including changing market conditions, consolidation supported by economies of scale, demographic change, and environmental concerns have resulted in increasingly challenging economic conditions for ranch operators, especially smaller operators.

Alternatives C and F would have adverse cumulative social and economic impacts related to grazing, due to the AUM reductions proposed in these alternatives and the already challenging conditions for operators of ranches and grazing operations. Alternatives B, D, E, and the Proposed Plan would also entail some changes to management of grazing lands, but in the long run it is expected that changes to vegetation treatments would sustain rangeland health and would ultimately not adversely impact counties and communities.

In terms of geographic regions, the cumulative effects on livestock grazing operators would occur in several counties, but would be most substantial in Lassen, Humboldt, Lander, Elko and White Pine Counties and possibly northern portions of Nye County.

¹ The exact shares are not shown because of differences in the 2010 source of employment data in **Table 5-49** and **Section 3.22**.

The other effect identified in **Section 4.20**, Socioeconomics and Environmental Justice that could lead to a cumulatively considerable contribution to impacts would be potential fiscal effects, especially in the smaller counties that are also more dependent on economic activities on public lands. Because specific impacts on local government tax revenues could not be quantified, the nature of the potential cumulative effect is not possible to characterize beyond the analysis in **Section 4.20**, Socioeconomics and Environmental Justice. That analysis notes specific counties in which local tax revenues could be most affected by the management alternatives.

Other effects, including potential changes in recreation patterns and changes in economic activity related to wind energy and transmission lines, would not be expected to contribute to cumulative effects. From a cumulative effects standpoint the economic and social impacts of these changes would be relatively minor, as documented in **Section 4.20**, Socioeconomics and Environmental Justice, and would not particularly alter existing trends in the study area.

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Chapter 6

Consultation and Coordination

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CHAPTER 6

CONSULTATION AND COORDINATION

6.1 INTRODUCTION

This chapter describes the public outreach and participation opportunities made available through the development of this LUPA/EIS and consultation and coordination efforts with tribes, government agencies, and other stakeholders. This chapter also lists the interdisciplinary team of staff who prepared the LUPA/EIS.

The BLM and Forest Service land use planning activities are conducted in accordance with requirements of the NEPA, FLPMA, NFMA, CEQ regulations, BLM policies and procedures implementing NEPA, and US Department of Agriculture and Forest Service policies and procedures implementing NEPA. NEPA and associated laws, regulations, and policies require the BLM and Forest Service to seek public involvement early on and throughout the planning process to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives. Public involvement and agency consultation and coordination, which have been at the heart of the planning process leading to this Proposed LUPA/Final EIS, were achieved through Federal Register notices, public and informal meetings, individual contacts, media releases, and the Greater Sage-Grouse Planning Strategy Northeastern California and Nevada Sub-Region project website:

<http://www.blm.gov/wo/st/en/prog/more/sagegrouse/western.html>

6.2 COLLABORATION

Federal laws require the lead agency to consult with certain federal and state agencies and entities and Native American tribes (40 CFR 1502.25) during the NEPA decision-making process. Federal agencies are also directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 CFR 1500.4-5).

In addition to formal scoping (**Section 6.4.1**, Scoping Process), the BLM and Forest Service have implemented an extensive collaborative outreach and public involvement process that has included coordinating with cooperating agencies, holding public scoping meetings, holding a socioeconomic workshop, and holding public open houses for the Draft LUPA/EIS. The BLM and Forest Service will continue to meet with interested agencies and organizations throughout the planning process, as appropriate.

6.2.1 Native American Tribal Consultation

The BLM and Forest Service began tribal consultation by requesting a consultation meeting with area tribes to discuss the details of the GRSG planning efforts. Each of the tribes was also invited to participate in the planning effort as cooperating agencies. The list of tribes contacted, as well as the results of consultation to date, are described in **Table 6-1** and **Table 6-2**.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Battle Mountain Band	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	6/5/2012—Consultation invitation letter sent.	
	7/25/2012—Consultation with Battle Mountain Band (Vice Chair and tribal members), BLM Battle Mountain District (Doug Furtado and Tim Coward), and Forest Service (Steve Williams).	Tribe mentioned concerns that disturbance from people and crows eating eggs are affecting GRSG populations.
Yomba Shoshone	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	6/5/2012—Consultation invitation letter sent.	
	6/8/2012—Consultation with Yomba Shoshone (Chair and tribal members), BLM Battle Mountain District (Chris Cook and Tim Coward), and Forest Service (Steve Williams).	No GRSG-related comments received.
Fallon Paiute	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	6/12/2012—Consultation invitation letter sent.	
	7/17/2012—Consultation with Fallon Paiute (Vice Chair and tribal members), BLM Carson City District (Teresa Knutson and Susan McCabe).	Tribe expressed concerns about restricted access to pine nutting areas. Tribal members sometimes access pine nutting areas by OHVs and 4-wheel drive vehicles. Tribe expressed concerns that the current drought and jets breaking the sound

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
		barrier may disrupt GRSGs, especially during hatching season.
Reno-Sparks Indian Colony (RSIC)	11/17/2011—Consultation with RSIC (Michon Eben, Cultural Resource Director), and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	3/1/2012—Phone Conversation with RSIC (Michon Eben) and BLM Carson City District (Jim Carter).	Tribe has concerns with GRSG habitat.
	4/6/2012—Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	6/12/2012—Consultation invitation letter sent—Carson City District.	No GRSG-related comments received.
	7/2/2012—Update on LUPA/EIS sent.	No GRSG-related comments received.
	9/19/2012—Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	2/1/2013—Consultation with RSIC (Michon Eben, Cultural Resource Director) and BLM Eagle Lake Field Office (Ken Collum, Sharynn Blood, and Marilla Baker).	No GRSG-related comments received.
Walker River Paiute	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	6/12/2012—Consultation invitation letter sent.	
	6/29/2012—Consultation with Walker River Paiute (Vice Chair and tribal members), BLM Carson City District (Teresa Knutson and Susan McCabe).	No GRSG-related comments received.
Washoe	11/1/2011—Consultation with Washoe Tribe (Darrel Cruz, Tribal Historic Preservation	No GRSG-related comments received.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	Officer) and BLM Eagle Lake Field Office (Sharynn Blood).	
	12/7/2011—Invitation as cooperating agency.	Signed MOU as a cooperating agency. Comments received on May 8, 2013. Tribe is concerned about invasive species, as well as the impact of tree thinning projects on juniper trees, which are important to the tribe.
	2/29/2012—Phone conversation with Washoe Tribe (Darrel Cruz, Washoe Tribal Historic Preservation Officer) and BLM Carson City District (Jim Carter).	Tribe is very concerned about GRSG habitat.
	3/2/2012—Phone conversation with Washoe Tribe (Marie Barry, Washoe Environmental Director) and BLM Carson City District (Jim Carter).	Tribe has previously commented on GRSG and habitat for Pine Nut Plan Amendment, and hopes those comments will be moved forward during the BLM's GRSG planning.
	4/18/2012—Update on LUPA/EIS sent and phone call.	No GRSG-related comments received.
	6/12/2012—Consultation invitation letter sent by Carson City BLM.	No GRSG-related comments received.
	7/2/2012—Update on LUPA/EIS sent by Eagle Lake Field Office.	No GRSG-related comments received.
	11/13/2012—Consultation with Washoe Tribe (Darrel Cruz, Tribal Historic Preservation Officer) and BLM Eagle Lake Field Office (Sharynn Blood).	No GRSG-related comments received.
Yerington Paiute	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	3/1/2012—Phone conversation with Yerington (Shelly Pugh) and BLM Carson City District (Jim Carter).	No GRSG-related comments received.
	6/12/2012—Consultation invitation letter sent.	No further contacts.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Duck Valley Sho-Pai	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 6/26/2012—Consultation with Duck Valley Sho-Pai (Chairman, Vice-Chair, tribal facilitator, tribal members) and Forest Service (Jeanne Higgins). 8/3/2012—2nd consultation invitation letter sent by Elko BLM.	Did not sign MOU as a cooperating agency. Tribe is concerned that cattle grazing and military flights negatively impact GRSG populations. In particular, sonic booms from military jets adversely impact GRSG eggs and breeding at leks. No GRSG-related comments received.
Te-Moak Tribe	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 8/3/2012—2nd consultation invitation letter sent by Elko BLM.	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Wells Band	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 8/3/2012—2nd consultation invitation letter sent by Elko BLM.	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
South Fork Band	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 8/3/2012—2nd consultation invitation letter sent by Elko BLM.	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Elko Band	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 8/3/2012—2nd consultation invitation letter sent by Elko BLM.	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Goshute Tribe	12/7/2011—Invitation as cooperating agency. 2/10/2012—Consultation with Goshute Tribe (Chair and tribal members), BLM Utah (Kevin Oliver and Quincy Bahr), and BLM Ely District	Did not sign MOU as a cooperating agency. No GRSG-related comments received.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	(Elvis Wall).	
	6/6/2012—Consultation invitation letter sent. 7/6/2012—Consultation with Goshute Tribe (Chair, Vice Chair, and tribal members), BLM Ely District (Michael Herder and Elvis Wall), and Forest Service (Jose Noriega).	Tribe identified GRSG habitat on the reservation. Tribe was concerned that Nevada BLM and Utah might not have a consistent approach toward GRSG management. Tribe was concerned how the GRSG plan would affect grazing. Tribe supports efforts to enhance GRSG habitat.
Duckwater	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 7/2/2012—Consultation with Duckwater Tribe (Chair and tribal members) and BLM Ely District (Rosemary Thomas, Miles Kreidler, and Elvis Wall).	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Ely Shoshone	12/7/2011—Invitation as cooperating agency. 6/6/2012—Consultation invitation letter sent. 7/10/2012—Consultation with Ely Shoshone Tribe (Chair and tribal members) and BLM Ely District (Rosemary Thomas and Elvis Wall).	Did not sign MOU as a cooperating agency. Tribe noted that there are GRSG habitat areas in the reservation lands. Tribe expressed concerns that the undertaking might restrict their access to pine nutting areas and wild game hunting through road closures. Tribe expressed concern that GRSG are a hunted species at the same time their numbers are dwindling.
Pyramid Lake Paiute	12/7/2011—Invitation as cooperating agency. 2/29/12; 3/1/2012—Left phone messages regarding letter of 12/7/2011. 4/26/12—Consultation with Pyramid Lake Paiute Tribe (Chair and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood). 6/8/2012—Consultation invitation letter sent.	Signed MOU as a cooperating agency. No GRSG-related comments received. Tribe asked if it is possible to manage for both cattle and birds. The BLM responded that it should be possible.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	6/27/2012—Consultation with Pyramid Lake Paiute Tribe (Chair and tribal members) and BLM Winnemucca District (Mark Hall).	Tribe indicated that GRSG was a sacred bird, but they needed to balance this interest with economic reality of grazing and energy development. Tribe hopes the LUPA/EIS will result in better grazing management practices. Corvids and raptors nesting on utility and transmission lines are negatively impacting GRSG populations.
	7/2/2012—Update on LUPA/EIS sent.	No GRSG-related comments received.
	1/23/2013—Consultation with Pyramid Lake Paiute Tribe (Chair, Vice Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
Summit Lake Paiute	12/7/2011—Invitation as cooperating agency. 6/8/2012—Consultation invitation letter sent.	Signed MOU as a cooperating agency. Comments received on May 8, 2013. Tribe is concerned that current planned projects involving road realignments and land acquisition to expand reservation boundaries may be impacted. Tribe is concerned that restrictions may be placed on tribal members observing lekking behavior for traditional cultural practices. Tribe believes wild horses are impacting GRSG leks, and additional conservation measures may be necessary to reduce these impacts.
	7/21/2012—Consultation with Summit Lake Paiute Tribe (Chair and tribal members) and BLM Winnemucca District (Gene Seidlitz and Mark Hall).	Tribe indicated they would work with the USFWS to complete a GRSG survey and banding of birds on their reservation lands. Tribe feels that OHV use is negatively impacting GRSG populations.
Fort McDermitt	12/7/2011—Invitation as cooperating agency. 6/8/2012—Consultation invitation letter sent.	Did not sign MOU as a cooperating agency.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	6/18/2012—Consultation with Fort McDermitt Tribe (Chair and tribal members) and Forest Service (Jeff Ulrich).	Tribe expressed desire to be more involved in the LUPA/EIS process, especially the Governor's alternative.
	7/17/2012—Consultation with Fort McDermitt Tribe (Chair and tribal members) and BLM Winnemucca District (Gene Seidlitz, Mark Hall, and Kathy Ataman).	Tribe has particular concerns with GRSG populations in the Double H Mountains. Tribe has multiple needs; they recognize that cattle ranching can pose a threat to GRSGs, yet they rely on ranching activities as well. GRSG hold a special role for the tribes in traditional culture. Tribe is concerned that NDOW allows GRSG to be hunted while their numbers are in decline.
Lovelock Colony	12/7/2011—Invitation as cooperating agency. 6/8/2012—Consultation invitation letter sent. 9/19/2012—Consultation with Lovelock Colony (Chair) and BLM Winnemucca District (Ken Loda and Mark Hall).	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Winnemucca Colony	12/7/2011—Invitation as cooperating agency. 6/8/2012—Consultation invitation letter sent.	Did not sign MOU as a cooperating agency. No GRSG-related comments received.
Pit River Tribe	10/6/2011—Consultation invitation letter sent. 12/7/2011—Invitation as cooperating agency. 1/5/2012—Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members) and BLM Alturas, Eagle Lake, and Redding Field Offices (Tim Burke, Ken Collum, Jennifer Mata, Dennis Benson, Eric Ritter, Jack Scott, Sharynn Blood, Charlie Wright, Randy Chatterton, Jim Hunt, and Dereck Wilson). 4/5/2012—Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members) and BLM Alturas, Eagle Lake, and Redding Field Offices (Tim Burke, Ken Collum, Jennifer Mata, Eric Ritter, Jack Scott, and Sharynn Blood).	Did not sign MOU as a cooperating agency. No GRSG-related comments received. No GRSG-related comments received.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	7/5/2012—Consultation with Pit River Tribe (Chair, Vice-Chair, and tribal members) and BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, Jack Scott, Sharynn Blood, Spencer Pelton, Jen Rovanpera, and Devin Snyder).	No GRSG-related comments received.
	10/4/2012—Consultation with Pit River Tribe (Chair, Tribal Historic Preservation Officer, and tribal members) and BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, Jack Scott, Sharynn Blood, Jen Rovanpera, Rich Estabrook, and James Haerter).	No GRSG-related comments received.
	2/7/2013—Consultation with Pit River Tribe (Chair and tribal members), BLM Alturas and Eagle Lake Field Offices (Tim Burke, Ken Collum, David Scott, Sharynn Blood, Jen Rovanpera, and Emily Jennings).	One tribal member noted that wind farms do not seem conducive to GRSG habitat. Another tribal member discussed porcupines and GRSGs and the irony of forest management plans. The Forest Service used to kill porcupines because they were killing the juniper trees. Now the Forest Service is killing the juniper trees to conserve water. She then wondered what would be next: Would the Forest Service then plant trees that need water?
Klamath Tribes	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency and no specific comments received.
	2/1/2012—Consultation with Klamath Tribe (Perry Chocktoot, Klamath Tribes Cultural and Heritage Department Director) and BLM Alturas Field Manager (Tim Burke).	No GRSG-related comments received.
Susanville Indian Rancheria (SIR)	8/3/2011—Consultation invitation letter sent.	No GRSG-related comments received.
	8/3/2011—Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribe	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
	12/7/2011—Invitation as cooperating agency.	Signed MOU as a cooperating agency. No GRSG-related comments received.
	10/20/2011—Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	1/6/2012—Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Ken Collum, Sharynn Blood, Charlie Wright, Randy Chatterton, Dereck Wilson, and Jim Hunt).	No GRSG-related comments received.
	1/10/2012—Consultation with SIR (Chair, Tribal Historic Preservation Officer, tribal members) and BLM Alturas Field Office (Tim Burke and David Scott).	No GRSG-related comments received.
	4/6/2012—Consultation with SIR (Chair and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	7/6/2012—Consultation with SIR (Tribal Historic Preservation Officer and tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	10/5/2012—Consultation with SIR (Chair and Tribal Historic Preservation Officer) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	1/16/2013—Consultation with SIR (tribal members) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	4/12/2013—Consultation with SIR (Vice Chair, Tribal Historic Preservation Officer, tribal members) and BLM Eagle Lake Field Office (Sharynn Blood).	No GRSG-related comments received.

Table 6-1
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
GRSG Draft LUPA/EIS

Tribes	Letters Sent, Phone Calls Made, Consultation Meetings Held	Results
Greenville Rancheria	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	5/8/2012—Consultation invitation letter sent.	
	5/18/2012—Consultation with Greenville Rancheria (Lacie Miles, Environmental Director) and BLM Eagle Lake Field Office (Ken Collum and Sharynn Blood).	No GRSG-related comments received.
	7/2/2012—Update on LUPA/EIS sent.	No GRSG-related comments received.
	10/11/2012—Consultation with Greenville Rancheria (Lacie Miles, Environmental Director) and BLM Eagle Lake Field Office (Sharynn Blood).	No GRSG-related comments received.
	1/25/2013—Update on LUPA/EIS sent.	No GRSG-related comments received.
Hanylekim Maidu (Not Federally Recognized)	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	7/2/2012; 11/30/2012; 1/30/2013—Updates on LUPA/EIS sent.	No GRSG-related comments received.
Fort Bidwell Tribe	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	1/21/2012—Consultation invitation letter sent.	Tribe commented that the LUPA/EIS sounded like a good idea.
	11/14/2012—Consultation with Fort Bidwell Tribe (tribal members), and BLM Surprise Field Office (Tim Burke).	No GRSG-related comments received.
	3/9/2013—Consultation with Fort Bidwell Tribe (tribal members), and BLM Surprise Field Office (Tim Burke).	No GRSG-related comments received.
Cedarville Rancheria	12/7/2011—Invitation as cooperating agency.	Did not sign MOU as a cooperating agency.
	1/3/2012—Consultation invitation letter sent.	
	2/28/2013—Consultation with Cedarville Rancheria (Tribal Administrator and tribal members) and BLM Surprise Field Office (Tim Burke).	No GRSG-related comments received.

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
July 12, 2013	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review and are scheduled for review by cooperating agencies in July 2013. The public comment period is scheduled for later in the summer of 2013. The draft alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	Susanville Indian Rancheria
July 13, 2013	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS updates. The BLM was asked how many GRSG were in the field office area, 6,000 to 7,000 currently.	Fort Bidwell Tribe
August 1, 2013	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation: The Draft LUPA/EIS should be available for review by September 2013 (subsequent proposed release date was October 10, 2013). There will be a 90-day comment period with the Proposed LUPA/Final EIS due in spring 2014, followed by a record of decision.	Pit River Tribe
August 6, 2013	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review and are scheduled for review by cooperating agencies in July 2013. The public comment period is scheduled for fall 2013. The draft alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	Washoe
August 9, 2013	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review and are scheduled for review by cooperating agencies in July 2013. The public comment period is scheduled for fall 2013. The draft alternatives contain many new restrictions for development in GRSG-	Reno-Sparks Indian Colony

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
		occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	
August 29, 2013	BLM—Eagle Lake Field Office	E-mail or mail project updates, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review and are scheduled for review by cooperating agencies in July 2013. The public comment period is scheduled for early fall 2013. The draft alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	Pyramid Lake Paiute Tribe Greenville Rancheria Honey Lake Maidu
September 12, 2013	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update. The tribe asked for a copy of the GRSG LUPA/EIS.	Cedarville Rancheria
October 19, 2013	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The BLM informed the tribe that the draft GRSG LUPA/EIS will be released in November 2013, and there was going to be a public meeting in Cedarville on December 3, 2013, to discuss it.	Summit Lake Tribe
October 25, 2013	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review and are scheduled for review by cooperating agencies in July 2013. The public comment period is scheduled for later in the summer of 2013. The draft alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	Susanville Indian Rancheria
November 1, 2013	BLM—Winnemucca District	Phone calls to tribes informing them of the release of the Draft LUPA/EIS for comment.	Fort McDermitt Tribe Pyramid Lake Paiute Tribe Summit Lake Paiute Tribe Lovelock Paiute Tribe

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
November 1, 2013	BLM—Ely District	Phone calls to tribes informing them of the release of the Draft LUPA/EIS for comment. Requested to be on agenda of the December 6, 2013, Goshute Tribal Council meeting, the agenda of the November 12, 2013, Ely Shoshone Tribal Council meeting, and the agenda of the November 25, 2013, Duckwater Tribal Council meeting.	Duckwater Shoshone Tribe Ely Shoshone Tribe Goshute Tribe
November 1, 2013 November 5, 2013	BLM—Elko District	Phone calls to tribes informing them of the release of the Draft LUPA/EIS for comment. Informed tribes of GRSG Draft LUPA/EIS open house to be held at the BLM Elko District Office on December 11, 2013.	TeMoak Tribe of Western Shoshone Elko Band South Fork Band
November 4, 2013	Forest Service	Attended 48th Annual Inter-Tribal Council of Nevada Executive Session in Reno, Nevada. Hand-delivered hard copies and digital copies of the Draft LUPA/EIS and Draft LUPA/EIS Executive Summary.	Battle Mountain Band Carson Colony Community Council Duckwater Shoshone Tribe Elko Band Ely Shoshone Tribe Fallon Paiute-Shoshone Tribe Fort McDermitt Tribe Goshute Tribe Moapa Tribe Pyramid Lake Paiute Tribe Reno-Sparks Indian Colony South Fork Band Stewart Community Council Timbisha Shoshone Tribe TeMoak Tribe of Western Shoshone Walker River Paiute Tribe

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
			Washoe Tribe Wells Band Woodsford Community Council Yomba Shoshone Tribe
November 5, 2013	Forest Service	Phone call and e-mail to tribe informing them of the release of the Draft LUPA/EIS for comment.	Duck Valley Sho-Pai Tribe
November 7, 2013	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation, including GRSG LUPA/EIS update: Draft LUPA/EIS issued on November 1, 2013, contains six alternatives and a 90-day public comment period. The document is long, so focus is best spent on Chapter 2, which outlines the preferred alternatives. Public meetings are planned for December 3 in Cedarville, December 4 in Susanville, and December 5 in Reno. Other meetings will be held elsewhere throughout Nevada as well.	Pit River Tribe
November 20, 2013	BLM—Eagle Lake Field Office	E-mail or mail project updates, including GRSG LUPA/EIS update (Draft LUPA/EIS is out for comment and CD is available): The BLM has been working on a Draft LUPA/EIS for the GRSG LUPA/EIS. The Draft LUPA/EIS contains many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining. The Draft LUPA/EIS is available on-line at http://www.blm.gov/nv/st/en/prog/wildlife/greater_sage-grouse.html . A public meeting will be held in Susanville in Jensen Hall at the Lassen County Fairgrounds on December 4, 2013, from 5:30 to 7:30 pm. A Sage-Grouse Newsletter was also distributed.	Pyramid Lake Paiute Tribe Washoe Greenville Rancheria Reno-Sparks Indian Colony Honey Lake Maidu
December 12, 2013	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS updates. Tribe wanted to know why there is a hunting season if GRSG are going to be endangered and why, if the BLM works with state agencies, are the ideas of GRSG management so different?	Fort Bidwell Tribe

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
December 13, 2013	BLM—Battle Mountain District	Government-to-government meeting with tribal council. Presented tribe with digital copy of the Draft LUPA/EIS, as well as handouts that were available at a GRSG Draft LUPA/EIS open house held earlier in Austin, Nevada.	Yomba Shoshone Tribe
January 10, 2014	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation, including GRSG LUPA/EIS updates. The BLM has been working on draft alternatives for the GRSG LUPA/EIS. The Draft LUPA/EIS is out for public comment until January 29, 2014. The Proposed LUPA/Final EIS is expected to be out in June 2014.	Susanville Indian Rancheria
January 15, 2014	BLM—Alturas Field Office	Face-to-face consultation, including GRSG LUPA/EIS updates. Draft LUPA/EIS is out for comment, and the BLM has been working on draft alternatives of the GRSG LUPA/EIS. At this consultation, the BLM Alturas Field Office was informed that the GRSG taught the Klamath Tribes to dance.	Klamath Tribes
January 18, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update.	Summit Lake Tribe
January 29, 2014	BLM—Eagle Lake Field Office	E-mail or mail project updates, including GRSG LUPA/EIS update: The Draft LUPA/EIS is available for public comment. The comment period closes on January 29, 2014.	Pyramid Lake Paiute Tribe Washoe Greenville Rancheria Reno Sparks Indian Colony Honey Lake Maidu
February 2, 2014	BLM—Eagle Lake Field Office	E-mail project updates, including GRSG LUPA/EIS update: The USFWS has given the GRSG a status of “warranted but precluded,” which means that while it feels the bird is warranted for listing under the Endangered Species Act, there are other species that are of higher priority. One of the criteria in the listing decision was a lack of regulatory mechanisms in place to protect the bird. The BLM’s RMPs are the source of regulatory mechanisms for land management in each field office. In response to the USFWS decision, the BLM will be amending the RMPs throughout the entire range of the GRSG in order to provide more information to USFWS ahead of	Reno Sparks Indian Colony

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
		its listing schedule, which is proposed for the end of 2015. For northeast California, this means amendments of the Alturas, Eagle Lake, and Surprise RMPs. The BLM would plan on using the information currently contained in the RMPs and the GRSg strategy (such as Buffalo Skedaddle), combined with any new data collected in order to amend the RMPs. In the meantime, the BLM will follow the interim direction from the Washington Office.	
February 6, 2014	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation, including GRSg LUPA/EIS updates: The draft was issued November 1, 2013, and the public comment period on the draft ended on January 29, 2014. The BLM is now reviewing approximately 17,000 comment letters. The Proposed LUPA/Final EIS is scheduled to come out in spring or summer of 2014.	Pit River Tribes
February 14, 2014	BLM—Winnemucca District	E-mail inviting the tribe to a government-to-government consultation meeting on the Draft LUPA/EIS. Invitation is in response to a tribal letter of February 10, 2014, requesting a consultation meeting.	Fort McDermitt Tribe
March 6, 2014	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSg LUPA/EIS updates: The BLM has been working on draft alternatives for the GRSg LUPA/EIS. Public comment for the draft amendment closed on January 29, 2014. The Proposed LUPA/Final EIS is expected to be out in September 2014.	Greenville Rancheria
March 8, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSg LUPA/EIS updates.	Fort Bidwell Tribe
March 14, 2014	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSg LUPA/EIS updates: The BLM has been working on draft alternatives for the GRSg LUPA/EIS. The Proposed LUPA/Final EIS is expected to be out in September 2014.	Reno-Sparks Indian Colony
April 4, 2014	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSg LUPA/EIS updates: The Proposed LUPA/Final EIS is expected to be signed in September 2014. The USFWS will make a decision by September 2015.	Susanville Indian Rancheria

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
April 4, 2014	BLM—Eagle Lake Field Office	Phone consultation, including GRSG LUPA/EIS update. The Proposed LUPA/Final EIS is expected to be signed in September 2014. Darrel asked if the Washoe Tribe had commented. I explained that I didn't know for sure since Bryan Hockett was the lead archaeologist on this project.	Washoe
April 8, 2014	BLM—Eagle Lake Field Office	E-mail project updates, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in September 2014.	Washoe Greenville Rancheria Reno-Sparks Indian Colony
April 9, 2014	BLM—Eagle Lake Field Office	Mail project updates, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in September 2014.	Honey Lake Maidu
April 12, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update.	Summit Lake Tribe
April 30, 2014	BLM—Eagle Lake Field Office	E-mail project updates, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in September 2014.	Pyramid Lake Paiute Tribe
May 1, 2014	BLM—Alturas and Eagle Lake Field Offices	The draft LUPA/EIS was issued November 1, 2013, and the public comment period on the draft ended on January 29, 2014. The BLM is now reviewing approximately 17,000 comment letters. The Proposed LUPA/Final EIS is scheduled to come out in September 2014. In 2015, the USFWS will look at the conservation efforts of the BLM and will determine if the GRSG should be listed as a threatened or endangered species.	Pit River Tribe
May 2, 2014	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in September 2014. The USFWS will make a decision by September 2015.	Pyramid Lake Paiute Tribe
June 27, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update. There were questions and comments regarding whether GRSG populations were in decline, especially around this area, and how predation by crows and coyotes contributed to the problem. It was noted how more livestock in the area attract	Cedarville Rancheria

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
		more coyotes, which can then lead to more predation on GRSG in the area.	
July 11, 2014	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in March 2015. The USFWS will make a decision by September 2015. The greatest threats to GRSG in the area are fire, followed by invasive weeds (cheatgrass) and juniper encroachment.	Susanville Indian Rancheria
July 14, 2014	BLM—Alturas Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in March 2015. The USFWS will make a decision by September 2015. The Klamath again stated that the GRSG taught Klamath Tribes how to dance.	Klamath Tribes
July 19, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update.	Summit Lake Tribe
July 23, 2014	BLM—Eagle Lake Field Office	E-mail project or mail updates, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is expected to be signed in November 2014.	Pyramid Lake Paiute Tribe Washoe Greenville Rancheria Reno-Sparks Indian Colony Honey Lake Maidu
July 25, 2014	BLM—Alturas and Eagle Lake Field Offices	Sent letter requesting information regarding tribal cultural resources, sensitive natural resources, resource access, or religious concerns relative to the proposed Plan Amendment. Government-to-government consultation with the tribe will be ongoing until the Land Use Plan Amendment is finalized and a record of decision is issued.	Pit River Tribe Pyramid Lake Paiute Tribe Washoe Greenville Rancheria Reno-Sparks Indian Colony Honey Lake Maidu Susanville Indian Rancheria
August 7, 2014	BLM—Alturas and Eagle Lake Field Offices	Face-to-face consultation, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is scheduled to come out in September 2014. In 2015 the USFWS will look at the BLM's conservation efforts and will determine if the GRSG should be listed as a threatened or endangered species.	Pit River Tribe

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
August 8, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update. A tribal member explained that around Barrel Springs there used to be plenty of GRSG and cattle and there is about the same amount of juniper today, so he believes that the decline in GRSGs is probably due to a road being put in. The road went through a lek, and traffic disturbs the grouse and other wildlife.	Fort Bidwell Tribe
October 3, 2014	BLM—Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. The Draft LUPA/EIS will be released on November 1, 2013, with a 90-day public comment period. A public meeting is scheduled for December 4, 2013, in Jensen Hall in Susanville. The draft alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining. The Proposed LUPA/Final EIS is expected to be out in June 2015. Handed out the GRSG newsletter.	Susanville Indian Rancheria
October 18, 2014	BLM—Surprise Field Office	Face-to-face consultation, including GRSG LUPA/EIS update.	Summit Lake Tribe
November 6, 2014	BLM—Eagle Lake Field Office	E-mail project updates, including GRSG LUPA/EIS update: The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review. Certain alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining."	Pyramid Lake Paiute Tribe Washoe Greenville Rancheria Reno-Sparks Indian Colony
November 11, 2014	BLM—Alturas and Eagle Lake Field Office	Face-to-face consultation, including GRSG LUPA/EIS update: The Proposed LUPA/Final EIS is scheduled to come out in June 2015. Later in 2015, the USFWS will look at the BLM's conservation efforts and determine if the GRSG should be listed as a threatened or endangered species.	Pit River Tribe

Table 6-2
Tribal Consultation and Outreach for the Nevada and Northeastern California Sub-region
Greater Sage-Grouse Proposed LUPA/Final EIS

Date	Federal Agency	Outreach	Tribes
December 2, 2014	BLM—Eagle Lake Field Office	Mail project updates, including GRSG LUPA/EIS update. The BLM has been working on draft alternatives for the GRSG LUPA/EIS. These alternatives are now out for internal review. Certain alternatives contain many new restrictions for development in GRSG-occupied habitat, particularly relating to new roads, transmission lines, wind and solar energy projects, and mining.	Honey Lake Maidu

The Proposed LUPA/Final EIS will be provided to the tribes concurrently with its release to the public.

6.2.2 California and Nevada State Historic Preservation Officer Consultation

On February 24, 2015 BLM contacted the NV State Historic Preservation Office (SHPO) to confirm that that NV SHPO did not wish to engage in formal consultation on the Nevada/Northeast California Greater Sage-Grouse LUPA/EIS because (1) the LUPA/EIS does not bring forward "Cultural Resources" for analysis because the ROD will not authorize any specific ground disturbing activities that may adversely affect historic properties; (2) the LUPA/EIS states that the implementation phase of the greater sage-grouse conservation effort will formally propose undertakings that will be subject to additional NEPA decisions and compliance with the Statewide BLM-SHPO Protocol Agreement dated December 22, 2014, and therefore formal SHPO involvement in this process will be during the implementation phase when historic properties may be adversely effected; and (3) the LUPA/EIS focuses on habitat and species preservation. NV SHPO responded on February 24, 2015 confirming that formal consultation is not necessary for the land use plan amendment (Palmer 2015).

The Draft LUPA/ EIS was sent to the California State Clearinghouse which disseminates NEPA documents to appropriate state agencies, however on May 13, 2015 BLM also contacted the California SHPO directly as follows:

"Per our phone conversation, this email is to seek your concurrence that CA SHPO does not wish to engage in formal consultation on the Nevada/Northeast California Greater Sage-Grouse EIS because (1) the EIS does not bring forward "Cultural Resources" for analysis because the ROD will not authorize any specific ground disturbing activities that may adversely affect historic properties; (2) the EIS states that the implementation phase of the greater sage-grouse conservation effort will formally propose undertakings that will be subject to

additional NEPA decisions and compliance with the Statewide BLM-SHPO Protocol Agreement dated February 2, 2014, (including the Supplemental Procedures for Sage Steppe Ecosystem Restoration), and therefore formal SHPO involvement in this process will be during the implementation phase when historic properties may be adversely effected; and (3) the EIS focuses on habitat and species preservation.

I would note for your reference that BLM California Applegate (formerly the Surprise and Alturas Field Offices) and Eagle Lake Field Offices have engaged in formal government-to-government consultation with tribes, pertaining to the sage-grouse EIS, since 2011. The tribes have expressed their concerns and provided comments about general sage grouse conservation through the consultation process and by submitting comments directly to the EIS, with some tribes participating as Cooperating Agencies. The EIS is noting, in general, that any conservation measures that preserve or enhance sage grouse habitat or numbers of birds would be beneficial to tribes continuing traditional activities related to the presence of sage grouse and other sagebrush dependent species.

I seek your concurrence via email response that we are in agreement.”

The Proposed LUPA/Final EIS will be provided to the California and Nevada State Historic Preservation Offices concurrently with its release to the public.

6.2.3 US Fish and Wildlife Service Consultation

To comply with Section 7(c) of the ESA, the BLM and Forest Service consulted with USFWS early in the planning process. USFWS provided input on planning issues, data collection and review, and alternatives development in their role as a cooperating agency.

Consultation with USFWS is required under Section 7(c) of the ESA prior to initiation of any project by the BLM and Forest Service that may affect any federally listed or endangered species or its habitat. This LUPA process is considered to be a major project, and the Proposed LUPA/Final EIS defines potential impacts on threatened and endangered species as a result of management actions proposed in the alternatives. The USFWS is a cooperating agency in this planning process, and USFWS staff has participated in interdisciplinary team meetings and has been provided drafts of the alternatives and analyses for discussion and input.

The BLM and Forest Service initiated informal consultation with a letter to the USFWS on October 25, 2013, and requested concurrence on which species would require consideration during consultation. Over the ensuing months, regular meetings and coordination efforts were held to identify the species that would be analyzed in the biological assessment, address which actions could affect those species, and determine whether the implementation of the Proposed Plan “may affect” the species for which this consultation occurred.

In May 2015, the biological assessment was formally submitted to the USFWS for review (see **Appendix W**, Joint BLM and Forest Service Biological Assessment/Biological Evaluation). The USFWS will evaluate the biological assessment and either concur with the determination via memorandum or prepare a biological opinion. The USFWS response to this consultation process (either the memorandum or the biological opinion) will be included in the RODs.

Outside of formal consultation, the BLM and Forest Service regularly met with the sub-regional USFWS representative during the Proposed LUPA/Final EIS phase to develop a proposed plan within the range of alternatives that would best meet GRSG habitat objectives and address public comments and concerns. The meetings with the USFWS representative often took place with biologists from the State of Nevada and the State of Nevada Sagebrush Ecosystem Technical Team. USFWS representatives attended meetings on the following dates:

- Nevada Sage Brush Ecosystem Science Advisory Team Meeting, December 5, 2013
- Interagency Coordination Meeting, February 6, 2014
- Interagency Coordination Meeting, March 6, 2014
- Interagency Coordination Meeting, March 27, 2014
- Interagency Coordination Meeting, April 7, 2014
- Interagency Coordination Meeting, April 21, 2014
- Population Trend Triggers Discussion, April 30, 2014
- Interagency Coordination Meeting, May 15, 2014
- Interagency Coordination Meeting, June 11, 2014
- BLM-Forest Service and USFWS Coordination, July 23, 2014
- NVCA GRSG EIS-Habitat Objectives Comparison Meeting, August 6, 2014
- Interagency Coordination Meeting, September 24, 2014
- Interagency Coordination Meeting, November 19, 2014
- Interagency Coordination Meeting, December 8, 2014
- Interagency Coordination Meeting, March 16, 2015

6.3 COOPERATING AGENCIES/ENTITIES

A cooperating agency/entity is any federal, state, or local government agency or Native American tribe that enters into a formal agreement with a lead federal agency to help develop an environmental analysis. More specifically, cooperating agencies/entities “work with the BLM, sharing knowledge and resources, to

achieve desired outcomes for public lands and communities within statutory and regulatory frameworks” (BLM Land Use Planning Handbook H-1601-1). A federal agency, state agency, local government, or Tribal government may qualify as a cooperating agency/entity because of “jurisdiction by law or special expertise” (40 CFR 1501.6 and 1508.5).

On December 7, 2011, the BLM wrote to 52 local, state, federal, and tribal representatives, inviting them to participate as cooperating agencies/entities for the Nevada and Northeastern California Greater Sage-Grouse Sub-region LUPA/EIS. Twenty-four agencies/entities agreed to participate on the LUPA/EIS as designated cooperating agencies/entities, all of which have signed Memoranda of Understanding (MOUs) with the BLM (**Table 6-3**). Some agencies/entities are participating as cooperating agencies/entities under the larger umbrella of the national-level MOUs described below.

Table 6-3
Cooperating Agencies/Entities

Agencies and Tribes Invited to be Cooperators	Agencies/Entities that Accepted	Agencies/Entities that Signed MOUs
Counties		
Churchill County	X	X
County of Carson City		
Douglas County		
Elko County	X	X
Esmeralda County		
Eureka County	X	X
Humboldt County	X	X
Lander County	X	X
Lassen County	X	X
Lincoln County	X	X
Lyon County		
Mineral County		
Modoc County	X	X
Nye County	X	X
Pershing County	X	X
Storey County	X	X
Washoe County	X	X
White Pine County	X	X
State Agencies		
Nevada Department of Agriculture		
Nevada Division of Minerals	X	
Nevada Department of Transportation	X	X
Nevada Department of Wildlife	X	X
Nevada Department of Conservation and Natural Resources	X	X
Office of the Governor - Nevada	N/A	

Table 6-3
Cooperating Agencies/Entities

Agencies and Tribes Invited to be Cooperators	Agencies/Entities that Accepted	Agencies/Entities that Signed MOUs
Federal Agencies		
Department of Defense Fallon Naval Air Station	X	
Department of Defense Nellis Air Force Base	X	
Federal Highway Planning Administration - Nevada	X	X
Natural Resources Conservation Service	X	X
US Fish and Wildlife Service	X	X
US Forest Service	X	X
Tribes		
Alturas Rancheria		
Battle Mountain Band		
Cedarville Rancheria		
Confederated Tribes of Goshute		
Duck Valley Shoshone-Paiute Tribe		
Duckwater Shoshone Tribe	X	
Elko Band		
Ely Shoshone Tribe		
Fallon Paiute Shoshone Tribe	X	
Fort Bidwell Reservation		
Fort McDermitt Paiute-Shoshone Tribe	X	
Goshute Tribe		
Greenville Rancheria		
Hanylekim Maidu		
Hungry Valley Community		
Ibapah Goshute Tribe	X	
Klamath Tribes		
Lovelock Indian Colony		
Pit River Tribe of California		
Pyramid Lake Paiute Tribe	X	X
Reno-Sparks Indian Colony		
South Fork Band		
Summit Lake Paiute Tribe	X	X
Susanville Indian Rancheria	X	X
Te-Moak Tribe of Western Shoshone		
Walker River Paiute Tribe	X	
Washoe Tribe	X	X
Wells Band		
Winnemucca Colony Council		
Yerington Paiute Tribe		
Yomba Shoshone Tribe	X	
Other		
Nevada Mining Association	N/A	
Nevada National Association of Counties		

The Forest Service and USFWS are participating in the LUPA/EIS process as cooperating agencies at a national level, and both agencies have signed MOUs at a national level.

Since starting on May 18, 2012, the BLM has conducted eight meetings with cooperating agencies/entities. Cooperating agencies/entities were also encouraged to attend the scoping open houses and provide comments during the scoping period (**Section 6.4.1**, Scoping Process). These agencies/entities have been engaged throughout the planning process, including during alternatives development.

During the Proposed LUPA/Final EIS development phase the cooperating agencies/entities were asked to provide input on the following documents:

- Draft Proposed Plan Amendment (DPPA), June 2, 2014
- Preliminary Draft of the Proposed LUPA/Final EIS, May 2015

6.4 COORDINATION AND CONSISTENCY

The BLM's planning regulations require that RMPs be "consistent with officially approved or adopted resource-related plans, and the policies and procedures contained therein, of other federal agencies, state and local governments, and Indian tribes, so long as the guidance and RMPs also are consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands" (43 CFR 1610.3-2(a)). The general requirement in FLPMA/planning regulations is to coordinate the LUP process with LUPs of other agencies, states, and local governments to the extent consistent with law (see FLPMA s. 202(c)(9) and 1610.3-1(a)); and the respective duties to be consistent with both officially approved or adopted plans. or duties res: non-official/non-approved plans (to the extent those plans are consistent w/ federal law, or to maximum extent practical) (see 1610.3-2(a)(b)). In accordance with FLPMA, the BLM kept apprised of and gave consideration to state, local, and tribal land use plans, assisted in resolving any inconsistencies, and provided meaningful public involvement of the Proposed LUPA/Final EIS.

As part of preparing the Draft LUPA/EIS, the BLM requested the state, county, and tribal government cooperating agencies review the range of alternatives and identify potential inconsistencies between the alternatives and each agency's applicable plans. This allowed the state, local, and tribal cooperating agencies to apply their special expertise regarding the familiarity with their own plans. The BLM's planning regulations also note that the BLM "shall identify any known inconsistencies with State or local plans, policies or programs" (43 CFR 1610.3-2(e)) when submitting a proposed plan amendment for the Governor's consistency review. This section identifies known inconsistencies between federal, state, local, and tribal plans and policies, using the previous county evaluations, comments provided during the public review period for the Draft LUPA/EIS, and agency evaluation of "officially approved or adopted resource

related plans” (43 CFR 1610.3-2 (a) and (b)). In instances where state and local plans, policies, or programs may differ, the BLM has disclosed both instances of inconsistency, but would defer to those of the state, per 43 CFR 1610.302(d).

The BLM is aware that there are specific state laws and local plans relevant to aspects of public land management that are discrete from, and independent of, federal law. However, BLM is bound by federal law. As a consequence, there may be inconsistencies that cannot be reconciled. The FLPMA and its implementing regulations require that BLM's land use plans be consistent with officially-approved state and local plans only if those plans are consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands. Where officially-approved state and local plans or policies and programs conflict with the purposes, policies, and programs of federal law applicable to public lands, there will be an inconsistency that cannot be resolved. With respect to officially-approved state and local policies and programs (as opposed to plans), this consistency provision only applies to the maximum extent practical. While county and federal planning processes, under FLPMA, are required to as integrated and consistent as practical, the federal agency planning process is not bound by or subject to state or county plans, planning processes, policies, or planning stipulations.

The following subheadings group the identification of known inconsistencies with the Proposed Plan by the type of agency (i.e., federal, state, local, and tribal). It is important to note that the identification of inconsistencies at this point in the planning process notifies state, local, and tribal governments of known inconsistencies. The absence of some inconsistencies could reflect either consistent management or an inconsistency that the agency has not specifically identified, per regulatory requirements. The formal consistency review period will allow agencies the opportunity to identify additional information, as applicable.

Consistency requirements are only applicable on BLM-administered lands. Consistency with state and local plans where there are no BLM-administered lands in the planning area is not addressed. In these instances consistency, as described above, is not required. However, cooperation regarding the agencies' applicable special expertise or jurisdiction by law has occurred.

6.4.1 Inconsistencies with State Plans, Policies, and Procedures

The State of Nevada finalized the *2014 Nevada Greater Sage-grouse Conservation Plan Sagebrush Ecosystem Program State of Nevada* in October 1, 2014. They designed their plan to “eliminate the threats facing [GRSG] while balancing the economic and social needs of the residents of Nevada through the use of ‘avoid, minimize and mitigate’ with additional offsite mitigation being accomplished by the use of the Nevada Conservation Credit System” (See **Appendix L**). There are many aspects of the State's plan and the BLM's Proposed Plan that are

conceptually consistent, though each plan uses different wording. Alternative E in **Chapter 2** is based on the State's plan.

There are aspects of the State's plan that are out of the BLM's jurisdiction, such as the recommendation for management dealing with predator control and hunting. However, they are not identified as inconsistencies because the BLM does not permit hunting or predator control. Inconsistencies will be limited to areas where the State's plan provides management direction for uses/areas for which the BLM has jurisdiction.

Known inconsistencies between the BLM's Proposed Plan and the Conservation Plan for Greater Sage-Grouse in Nevada include the following:

- The State of Nevada does not identify specific resource allocations, such as open or closed for mineral materials or exclusion, avoidance, or open for ROWs. Rather the State of Nevada's plan applies the concept of 'Avoid, Minimize, Mitigate' to reduce the threat of anthropogenic disturbances. The BLM Proposed Plan does identify specific allocations for each appropriate resource as a "regulatory mechanism" to reduce the threats to GRSG.
- The BLM's Proposed Plan identifies SFAs. Management of SFAs includes prioritization actions and recommends withdrawing these areas from mineral location and removing the two exceptions for the fluid mineral leasing NSO stipulation, compared with PHMA. There is nothing similar to this action in the State's plan.

6.4.2 Inconsistencies with County Plans, Policies, and Procedures

In their consistency evaluation of the range of alternatives for the Draft LUPA/EIS and in subsequent comments on the public review Draft LUPA/EIS, several counties, including Elko, Eureka, Lander, and Pershing in Nevada, emphasized a desire to preserve existing private property rights. Comments also noted that Alternatives B, C, D, and F from the Draft LUPA/EIS are inconsistent with county plans, primarily because they would restrict resource uses such as minerals and infrastructure development and would introduce the potential for road or grazing closures. The Proposed LUPA/Final EIS discloses that the preservation of valid existing rights is a planning criterion and all the programs acknowledge those rights. Several alternatives in the Proposed LUPA/Final EIS propose management to reduce disturbance from mineral and infrastructure development. While those actions would preserve valid existing rights, future development would likely be affected. Reductions in such development potential are generally inconsistent with the aforementioned county plans. However, the counties' plans may not be consistent with the BLM's National GRSG Strategy, for which this Proposed LUPA is being developed, in compliance with FLPMA.

Counties with adopted county land use plans identified additional inconsistencies with the BLM's alternatives that were more procedural in nature. At least three counties have land use planning documents that require all federal actions comply with local law. The Proposed Plan is inconsistent with these local county policies.

6.4.3 Inconsistencies with Tribal Plans, Policies, and Procedures

The Summit Lake Paiute Tribe did not specifically identify a plan related to GRSG management. However, they did acknowledge that Alternative D, the BLM's preferred alternative from the Draft LUPA/EIS, could limit their ability to continue to provide electrical power to the reservation by requiring burying of overhead lines during permit renewal. The need to provide electric power to the reservation is assumed to be a key element of the strategy for economic sustainability for the Summit Lake Paiute Tribe. The BLM Proposed Plan was revised from the BLM Preferred Alternative to not have the requirement to bury existing powerlines as a requirement in the permit renewal process.

The Summit Lake Paiute Tribe noted that they are pursuing several land acquisition initiatives to expand the reservation boundaries radiating from the reservation boundary out a distance of 25 miles to protect the biodiversity of species endemic to the Summit Lake watershed and surrounding area, including GRSG. They requested the BLM Proposed Plan be revised to support the tribe's initiative to acquire public lands. The tribe's initiative to acquire additional federal lands that are identified as PHMA or GHMA would be inconsistent with the BLM Proposed Plan direction to retain GRSG habitat, unless the tribe's action could be demonstrated to result in a net conservation gain for GRSG and its habitat.

6.5 RESOURCE ADVISORY COUNCILS

Resource Advisory Councils (RACs) are citizen-based groups that provide an opportunity for individuals from all backgrounds and interests to have a voice in the management of public lands, and to help improve their health and productivity. RAC recommendations address all public land issues, including land use planning, recreation, noxious weeds, and wild horse and burro herd management areas. Nevada has three RACs in the Nevada and northeastern California Greater Sage-Grouse Planning Area: the Mojave-Southern Great Basin, the Sierra Front-Northwestern Great Basin, and the Northeastern Great Basin. California has one RAC in the Nevada and northeastern California Greater Sage-Grouse Planning Area: the newly developed Northern California RAC. The BLM and Forest Service presented status updates at the following RAC meetings from 2011 through the present day:

- BLM Nevada Tri-RAC meeting, January 26-27, 2012
- Northeastern Great Basin RAC meeting, April 19, 2012
- BLM Nevada Tri-RAC meeting, January 31-February 1, 2013

- Sierra Front-Northwestern Great Basin RAC meeting, April 4-5, 2013
- Northeastern Great Basin RAC meeting, June 27, 2013
- Northeastern Great Basin RAC meeting, September 12, 2013
- Northeast California RAC Subcommittee on Sage Grouse, November 12, 2013
- Northeast California RAC meeting, December 4, 2013
- Sierra Front-Northwestern Great Basin RAC Sage grouse subgroup meeting, January 10, 2014
- BLM Nevada Tri-RAC meeting, February 6-7, 2014
- Northeastern Great Basin RAC meeting, May 15, 2014
- BLM Nevada Tri-RAC meeting, February 26-27, 2015

6.6 PUBLIC INVOLVEMENT

Public involvement is a vital component of both the LUPA and EIS processes. Public involvement vests the public in the decision-making process and allows for full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR Part 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process. Section 202 of the FLPMA directs the Secretary of the Interior to establish procedures for public involvement during land use planning actions on BLM-administered lands. These procedures can be found in the BLM's *Land Use Planning Handbook* (H-1601-1; BLM 2005a). Public involvement for the Nevada and Northeastern California Greater Sage-Grouse Sub-region LUPA/EIS includes the following:

- Public scoping before beginning NEPA analysis to determine the scope of issues and alternatives to be addressed in the LUPA/EIS
- Public outreach via newsletters and press releases throughout the LUPA/EIS process
- Collaboration with federal, state, local, and tribal governments and cooperating agencies throughout the LUPA/EIS process
- Public review and comment on the Draft LUPA/EIS
- Public review and comment on the Proposed LUPA/Final EIS

Between July 2011 and April 2014, 19 press releases related to GRSG were issued. They covered a variety of topics, including policy, deferral of parcels in oil and gas lease sales, comment periods, and public workshop announcements. In addition, periodic updates were scheduled in 2014 to keep the public up-to-date on the preparation of the Proposed LUPA/ Final EIS and were posted to the website.

Efforts were also made to promote GRSG meetings and comment periods and to educate people about general GRSG facts using social media, including a project website:

http://www.blm.gov/nv/st/en/prog/wildlife/greater_sage-grouse.html

6.6.1 Scoping Process

The formal public scoping process for the Nevada and Northeastern California Greater Sage-Grouse Sub-region LUPA/EIS began on December 9, 2011, with the publication of the notice of intent in the Federal Register (*76 Federal Register* 77008-77011). The notice of intent notified the public of the BLM's intent to prepare EISs and supplemental EISs to incorporate GRSG conservation measures into LUPs; it also initiated the public scoping period. A notice of correction to the notice of intent was released on February 10, 2012 (*77 Federal Register* 7178-7179). The notice of correction extended the scoping period until March 23, 2012.

Project Websites

The BLM launched a national GRSG conservation website as part of its efforts to maintain and restore GRSG habitat on public lands. The national website is available on the Internet at <http://www.blm.gov/wo/st/en/prog/more/sagegrouse.html>. The BLM also hosts a Great Basin regional website: <http://www.blm.gov/wo/st/en/prog/more/sagegrouse/western.html>. These sites are regularly updated to provide the public with the latest information about the planning process. The Great Basin website provides background information about the project, a public involvement timeline, maps of the planning areas, and copies of public information documents and the notice of intent. The dates and locations of scoping open houses were also announced on the Great Basin website.

Press Release

A press release was made available on the national and Great Basin region websites on December 8, 2011, announcing the scoping period for the LUPA/EIS process. The Nevada and California BLM State Offices also distributed press releases on January 4, 2012, announcing the scoping period for the LUPA/EIS process. The press releases provided information on the scoping open houses being held and described the various methods for submitting comments. A second press release was posted on the national and Great Basin websites on February 7, 2012, announcing the extension of the public scoping period to March 23, 2012. A third press release was issued on the national and Great Basin websites on February 9, 2012, announcing the addition of National Forests to the GRSG planning efforts.

Public Scoping Open Houses

The BLM hosted seven open houses to provide the public with an opportunity to become involved, learn about the project and the planning process, meet the planning team members, and offer comments. The open house was advertised

via press release and the Great Basin website. The scoping meetings were held in an open house format to encourage participants to discuss concerns and questions with the BLM and other agency staff representatives. The locations and dates of the open houses were as follows:

- Tonopah, Nevada – January 9, 2012
- Ely, Nevada – January 10, 2012
- Elko, Nevada – January 11, 2012
- Winnemucca, Nevada – January 12, 2012
- Alturas, CA – January 18, 2012
- Susanville, CA – January 19, 2012
- Reno, Nevada – January 30, 2012

Scoping Comments Received

Detailed information about the comments received can be found in the *National Greater Sage-Grouse Planning Strategy Scoping Summary Report*, finalized in May 2012 (BLM 2012b). A total of 585 unique written submissions were received for the Great Basin region. Of these, 428 were specific to California and Nevada. The issues identified during public scoping and outreach are described in **Section 1.5.2, Issues Identified for Consideration in the Nevada and Northeastern California Sub-Region Greater Sage-Grouse LUP Amendments**, of this LUPA/EIS. These issues guided the development of alternative management strategies outlined in **Chapter 2** of this LUPA/EIS.

6.6.2 Public Comment on the Draft LUPA/EIS

Public Meetings

A Notice of Availability (NOA) for the Draft LUPA/EIS was published in the Federal Register on November 1, 2013. The NOA initiated a 90-day public comment period, which ended on January 29, 2014. The BLM and Forest Service notified the public of open house meetings via the project website and a news release to 33 media sites, including newspapers, radio, and television.

The BLM and Forest Service held seven public comment open houses for the Draft LUPA/EIS from December 3–December 12, 2013:

- Cedarville, California – December 3, 2013
- Susanville, California – December 4, 2013
- Reno, Nevada – December 5, 2013
- Tonopah, Nevada – December 9, 2013
- Ely, Nevada – December 10, 2013
- Elko, Nevada – December 11, 2013

- Winnemucca, Nevada – December 12, 2013

All meetings were held from 5:30 to 7:30 pm. The goal of the open houses was to inform the public about the Draft LUPA/EIS and to obtain further public input on the alternatives that were developed and analyzed. In addition, the BLM and Forest Service sought comments on potential impacts resulting from the six alternatives. At the open houses, displays introduced the various resource topics and presented the six alternatives for the resource topics. Other displays explained the NEPA process and the methods for submitting comments. A slide show looped throughout the open house describing the Nevada and Northeastern California Sub-region Greater Sage-Grouse Draft LUPA/EIS preparation process.

Public comments were solicited at the open houses, where comment sheets were provided.

Comment Analysis Methodology

During the 90-day public comment period to receive comments on the Draft LUPA/EIS, the BLM and Forest Service received written comments by mail, email, and submissions at the public meetings. Comments covered a wide spectrum of thoughts, opinions, ideas, and concerns. The BLM and Forest Service recognize that commenters invested considerable time and effort to submit comments on the Draft LUPA/EIS and developed a comment analysis methodology to ensure that all comments were considered as directed by NEPA regulations.

According to NEPA, the BLM and Forest Service are required to identify and formally respond to all substantive public comments. The BLM and Forest Service developed a systematic process for responding to comments to ensure all substantive comments were tracked and considered. Upon receipt, each comment letter was assigned an identification number and logged into CommentWorks, a Web-based database that allowed the BLM and Forest Service to organize, categorize, and respond to comments. Substantive comments from each letter were coded to appropriate categories based on content of the comment, retaining the link to the commenter. The categories generally follow the sections presented in the Draft LUPA/EIS, though some relate to the planning process or editorial concerns.

Comments similar to each other were grouped under a topic heading, and the BLM and Forest Service drafted a statement summarizing the ideas contained in the comments. The responses were crafted to respond to the comments; a response indicates whether or not the commenters' points resulted in a change in the document. As a result of public comments, changes were made to the Draft LUPA/EIS and reflect consideration given to public comments. A summary of major changes between the Draft LUPA/EIS and the Proposed LUPA/Final EIS can be found in **Section 1.8**, Changes between the Draft LUPA/EIS and the

Proposed LUPA/Final EIS, in **Chapter 1** and the text boxes at the top of **Chapters 1** through **5**.

Although each comment letter was diligently considered, the comment analysis process involved determining whether a comment was substantive or nonsubstantive in nature. In performing this analysis, the BLM and Forest Service relied on the CEQ's regulations to determine what constituted a substantive comment.

A substantive comment does one or more of the following:

- Questions, with a reasonable basis, the accuracy of the information and/or analysis in the EIS
- Questions, with a reasonable basis, the adequacy of the information and/or analysis in the EIS
- Presents reasonable alternatives other than those presented in the Draft EIS that meet the purpose and need of the proposed action and address significant issues
- Questions, with a reasonable basis, the merits of an alternative or alternatives
- Causes changes in or revisions to the proposed action
- Questions, with a reasonable basis, the adequacy of the planning process itself

Additionally, BLM's NEPA handbook identifies the following types of substantive comments:

- Comments on the Adequacy of the Analysis: Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate are substantive in nature but may or may not lead to changes in the Final EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the manager responsible for preparing the EIS (the Authorized Officer) does not think that a change is warranted, the response should provide the rationale for that conclusion.
- Comments That Identify New Impacts, Alternatives, or Mitigation Measures: Public comments on a Draft EIS that identify impacts, alternatives, or mitigation measures that were not addressed in the draft are substantive. This type of comment requires the Authorized Officer to determine whether it warrants further consideration. If it

does, the Authorized Officer must determine whether the new impacts, new alternatives, or new mitigation measures should be analyzed in the Final EIS, a supplement to the Draft EIS, or a completely revised and recirculated Draft EIS.

- Disagreements with Significance Determinations: Comments that directly or indirectly question, with a reasonable basis, determinations regarding the significance or severity of impacts are substantive. A reevaluation of these determinations may be warranted and may lead to changes in the Final EIS. If, after reevaluation, the Authorized Officer does not think that a change is warranted, the response should provide the rationale for that conclusion.

Some submissions received contained substantive comments, but were out of the scope of this project. These included comments on subjects not related to this effort, other GRSF efforts, or BLM or Forest Service laws, rules, regulations, or policy. These comments were reviewed and sent along to the appropriate party as needed, but are not included in the comment response for this effort.

Comments that failed to meet the above description were considered nonsubstantive. Many comments received throughout the process expressed personal opinions or preferences, had little relevance to the adequacy or accuracy of the Draft LUPA/EIS, or represented commentary regarding resource management without any real connection to the document being reviewed. These comments did not provide specific information to assist the planning team in making a change to the Preferred Alternative, did not suggest other alternatives, and did not take issue with methods used in the Draft LUPA/EIS, and are not addressed further in this document.

Opinions, feelings, and preferences for one element or one alternative over another, and comments of a personal and/or philosophical nature were all read, analyzed, and considered, but because such comments are not substantive in nature, the BLM and Forest Service did not respond to them. It is also important to note that, while all comments were reviewed and considered, comments were not counted as “votes.” The NEPA public comment period is neither considered an election nor does it result in a representative sampling of the population. Therefore, public comments are not appropriate to be used as a democratic decision-making tool or as a scientific sampling mechanism.

Comments citing editorial changes to the document were reviewed and incorporated.

Public Comments

A total of 371 unique comment letters, forms, and emails were received during the 90-day public comment period. These documents resulted in 1,948

substantive comments. Out of the 371 comment letters, 204 were submitted by private individuals (55.0 percent); 60 by organizations, including businesses and environmental and wildlife protection groups (16.2 percent); 75 by associations, including user groups, recreational clubs, realty associations, industry groups, and partnerships (20.2 percent); 5 by federal agencies (1.3 percent); 8 by state governments (2.2 percent); 13 by local governments (3.5 percent); 3 by tribal governments (0.8 percent); and 3 letters were submitted anonymously (0.8 percent). The BLM and Forest Service parsed 1,948 substantive comments from the 371 submissions. Private individuals submitted 213 of these comments (10.9 percent), 560 were submitted by organizations (28.7 percent), 749 were submitted by associations (38.4 percent), 29 were submitted by federal agencies (1.5 percent), 9 were submitted by state agencies (0.5 percent), 289 were submitted by local governments (14.8 percent), 11 were submitted by tribal governments (0.6 percent), and 3 substantive comments came from anonymous submission (0.2 percent, see **Table 6-4**).

Table 6-4
Number of Unique Submissions and Comments by Affiliation

Group	Number of Submissions	Number of Comments
Private individuals	204	213
Organizations (including businesses and environmental and wildlife protection groups)	60	560
Associations (user groups, recreational clubs, realty associations, industry groups, partnerships, etc.)	75	749
Federal agencies (EPA, USFWS, USFS, NPS)	5	29
State government (state agencies, Governor's Office)	8	9
Local government (county commissions and departments)	13	289
Tribal government	3	11
Anonymous	3	3
Total	371	1,948

In addition to the unique submissions discussed above, 16,520 form letters were submitted during the public comment period. Form letters are exact or very close copies of a letter that are submitted multiple times by different individuals; individuals may add additional language to the letter, but this usually does not substantially change the content of the letter. Often, form letters are created by an organization and sent to their members, who in turn submit this letter to the planning effort. For the Nevada and Northeastern California Draft LUPA/EIS, 7 different form letter masters were submitted: 2,910 letters from WildEarth Guardians; 8,920 letters from the American Wild Horses Preservation Campaign; 2,510 letters from the American Bird Conservancy; 2,130 letters from Defenders of Wildlife; 30 letters from the Nevada Rural Electric Association; 10 letters from local ranchers; and 10 letters from Harney Electric Cooperative. One copy of each of these letters was included in the comment analysis process as a master form letter. All of the form letters were reviewed

for additional substantive content; this was included in the comment analysis process when present.

A review of the 1,948 substantive comments received revealed a high level of interest about the management of GRSG (369 comments, 18.9 percent), compliance with NEPA, FLPMA, and other laws (NEPA: 289 comments, 14.8 percent; other laws: 75 comments, 3.9 percent; and FLPMA: 74 comments, 3.8 percent), livestock grazing (237 comments, 12.1 percent), socioeconomics (142 comments, 7.3 percent), and sagebrush vegetation (87 comments, 4.5 percent). Other topics with high levels of interest were mineral development (locatable minerals: 59 comments, 3.0 percent; leasable minerals: 55 comments, 2.8 percent; and salable minerals: 4 comments, 0.2 percent), predation of GRSG (58 comments, 3.0 percent), lands and realty (54 comments, 2.8 percent), and fire and fuels (49 comments, 2.5 percent). Topics that received moderate interest were wild horses and burros (34 comments, 1.7 percent), travel management (30 comments, 1.5 percent), and riparian vegetation and water resources (25 comments, 1.3 percent each). The topics with the least amount of interest were recreation (13 comments, 0.7 percent), climate change (12 comments, 0.6 percent), noise and tribal interests (11 comments, 0.6 percent), fish and wildlife (8 comments, 0.4 percent each), lands with wilderness characteristics (8 comments, 0.4 percent each), soil resources (7 comments, 0.4 percent), and ACECs (5 comments, 0.3 percent). In addition to these topics, comments were collected that suggested editorial changes (138 comments, 7.1 percent), were substantive comments but considered out of scope of this document (63 comments, 3.2 percent), and requested an extension of the comment period (6 comments, 0.3 percent). These comments were reviewed and considered but not included in the formal comment responses effort. See **Table 6-5**.

Table 6-5
Number of Comments on the Draft LUPA/EIS by
Category

Topic	Number of Comments
Greater Sage-Grouse	369
NEPA	289
Livestock grazing	237
Socioeconomics	142
Vegetation – sagebrush	87
Other Laws	75
FLPMA	74
Locatable minerals	59
Predation	58
Leasable minerals	55
Lands and realty	54
Fire and fuels	49

Table 6-5
Number of Comments on the Draft LUPA/EIS by
Category

Topic	Number of Comments
Wild horses and burros	34
Travel management	30
Vegetation – riparian	25
Water resources	25
Recreation	13
Climate change	12
Noise	11
Tribal interests	11
Fish and wildlife	8
Lands with wilderness characteristics	8
Soil resources	7
ACECs	5
Salable minerals	4
Edits*	138
Out of scope*	63
Extension requests*	6
Total	1,948

*Comments in these categories were reviewed for their content but not included in the comment response effort.

The comments received on the Draft LUPA/EIS were similar to the issues raised during public scoping. In many cases, comments expressed a desire for very specific implementation-level (project-level) details to be included in the LUPA. As described in **Chapters 1** and **2**, the LUPA/EIS provides general guidance and identifies allowable uses and allocations but is not meant to address all details about individual projects. A separate environmental review will be conducted for specific projects at the implementation level to address these details. Some comments spanned several topical areas and included a discussion about a resource use or activity and listed concerns about the resources that would be impacted by the use, or conversely, the impact that restrictions would have on resource uses or activities.

All substantive comments, detailed summaries, and responses organized by resource, resource use, or LUPA/EIS planning regulation can be found in **Appendix C**. An overview of these summaries and responses can be found below in **Table 6-6**. Comments related to editorial changes, out of scope topics, extension requests, and nonsubstantive comments were not included in the comment response effort.

Table 6-6
Overview of Comments by Category

Topic	Overview
ACECs	Commenters requested that the data required for an ACEC designation be discussed, recommended certain areas for ACEC designation, and wanted to see a greater range of alternatives for ACEC locations.
Climate change	Commenters wanted to see a more thorough and rigorous analysis of climate change and its potential impacts on the planning area, a more complete definition of drought, and clarification on related management actions.
Fire and fuels	Commenters requested clarification on the potential impacts of the plan on fire conditions, suggested potential changes to alternatives or management actions, and provided additional references.
Fish and wildlife	Commenters noted that there may be impacts on other fish and wildlife species, including special status species, if the project area is managed solely for GRSG habitat.
FLPMA	Commenters claimed that the Draft LUPA/EIS failed to comply with the multiple use mandate required under FLPMA and the Multiple Use Sustained Yield Act required under the Forest Service. They also noted that the plan is not consistent with state, local, and tribal plans and policies, and that there needs to be a consistency review with local plans in the document.
Greater Sage-Grouse	Commenters claimed the NTT report was inadequate to use as a primary source in the plan, found the plan to be inconsistent with COT conservation objectives, requested clarification on the range of alternatives and habitat mapping, suggested additional literature to be used for best available information on GRSG, made recommendations on how to improve the impact analysis of various resources on GRSG, found the cumulative impacts to be deficient, and requested clarification or revisions to mitigation measures.
Lands and realty	Commenters requested clarification on or recommended specific changes to proposed management, recommended additional references related to infrastructure and changes in land use, found the analysis of impacts between lands and realty management and renewable energy infrastructure to be lacking, recommended additional projects for consideration under cumulative impacts, and considered Appendix A of the Draft LUPA/EIS to be inadequate.
Lands with wilderness characteristics	Commenters wanted additional lands with wilderness characteristics to be considered for the protection of GRSG and requested that these lands be analyzed more thoroughly.
Leasable minerals	Commenters wanted certain aspects of the alternatives clarified, such as reclamation vs. restoration, the NSO buffer, and how the disturbance cap would be applied. Commenters also recommended additional literature, wanted a more complete analysis of impacts and cumulative impacts, and voiced concerns over off-site mitigation,
Livestock grazing	Commenters recommended expanding the range of alternatives for livestock grazing, argued that retiring grazing permits requires Congressional action, requested clarification on certain grazing terms and management actions, found the analysis of impacts to be inadequate, requested additional items be added to the cumulative impacts section, and recommended additional mitigation measures.

Table 6-6
Overview of Comments by Category

Topic	Overview
Locatable minerals	Commenters suggested that additional management actions be included related to mitigation measures and withdrawals, noted that a thorough discussion of geology is missing from the document, found baseline data on disturbance to be incorrect, claimed that the alternatives were not compliant with current mining laws, and requested clarification on specific mining-related terms.
NEPA	Commenters asserted that the plan does not comply with the requirements of NEPA, did not adequately notify the public about the Draft LUPA/EIS, did not coordinate with local agencies, did not provide a wide enough range of alternatives, did not use the best available data, and have not provided adequate cumulative impacts analysis or mitigation measures.
Noise	Commenters questioned current studies used regarding low-frequency noise and wanted to see additional information used to determine the impacts of noise on different parts of the GRSG life cycle.
Other Laws	Commenters argued that the plan does not comply with other federal laws.
Predation	Commenters questioned why the BLM and Forest Service did not include the threat of predation in the Draft LUPA/EIS.
Recreation	Commenters recommended using seasonal closures, requested additional literature on the impacts of recreation on GRSG, wanted more language on the impacts of hunting on GRSG populations, and requested clarification on recreation management actions.
Salable minerals	Commenters requested specific changes to management actions and exemption language.
Socioeconomics	Commenters wanted the baseline data revised to include more current and relevant data, claimed the analysis used was at the wrong scale to make the information meaningful, and noted that the impacts analysis was inadequate in many ways.
Soil resources	Commenters recommended adding a section on geology or mineral resources, as well as recommended new references for the impacts of livestock grazing on biological soil crust.
Travel management	Commenters recommended different routes that should be closed, restricted, or kept open; recommended new references, including travel management plans already in place in BLM field offices; and recommended mitigation measures to help prevent the spread of invasive species.
Tribal interests	Commenters requested continued government-to-government consultation with the tribes in the planning area, that tribal plans and projects be included in the document, and that the BLM and Forest Service provide a better impacts analysis on the economy of local tribes.
Vegetation – riparian	Commenters noted that the BLM and Forest Service should apply adaptive management to riparian areas, disagreed with some of the metrics chosen to determine habitat objectives, and requested additional information be used in the baseline information and for impacts analysis.
Vegetation – sagebrush	Commenters voiced concern about pinyon-juniper expansion and the spread of invasive species into sagebrush ecosystems; requested additional information be provided to support reference sites, VDDT modeling, and

**Table 6-6
Overview of Comments by Category**

Topic	Overview
	utilization levels; and wanted to see a mitigation and monitoring program that increased overall sagebrush health.
Water resources	Commenters requested additional baseline information on 303(d) listed streams, a more comprehensive analysis of impacts from mineral development on water resources, and clarification of how existing drought management guidelines and requirements would be incorporated into the plan.
Wild horses and burros	Commenters noted that WHBs were not adequately protected, that forage for livestock and WHBs should not be combined, that the impacts analysis was insufficient, and that the National Academy of Sciences' 2013 recommendations should be incorporated into the plan.

Complete responses, including rationale and any associated changes made in the Proposed LUPA/Final EIS, can be found in **Appendix C**.

6.6.3 Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the LUPA/EIS process.

An NOA will be published in the Federal Register to notify the public of the availability of the Proposed LUPA/Final EIS. The NOA will also outline protest procedures during the 30-calendar-day protest period. Concurrent with the first 30 days of the protest period, a 60-day joint governor's consistency review (one for California and one for Nevada) will be implemented. The Proposed LUPA/Final EIS will be available for downloading from the project website at: http://www.blm.gov/nv/st/en/prog/wildlife/greater_sage-grouse.html. The Proposed LUPA/Final EIS will also be available for review at the BLM Nevada and California State Offices along with the Humboldt-Toiyabe Forest Ranger Districts. Press releases will be issued to notify the public of the Proposed LUPA/Final EIS availability. All recipients of the Draft LUPA/EIS and all parties who submitted written comments on the Draft LUPA/EIS will receive the Proposed LUPA/Final EIS in either a hard copy or CD form, or they will be able to download it from the project website. The BLM and Forest Service will notify those who previously received the Draft LUPA/EIS electronically. The BLM Nevada State Office maintains the distribution list for the Proposed LUPA/Final EIS, which is available on request.

Records of Decision will be issued by the BLM and the Forest Service after the release of the Proposed LUPA/Final EIS, the Governor's Consistency Review, and any resolution of protests received on the Proposed LUPA/Final EIS.

6.7 LIST OF PREPARERS

This LUPA/EIS was prepared by an interdisciplinary team of staff from the BLM, Forest Service, and Environmental Management and Planning Solutions, Inc. (see

Table 6-7). In addition, staff from numerous federal, state, and local agencies and nonprofit organizations contributed to developing the LUPA/EIS.

The following is a list of people that prepared or contributed to the development of the LUPA/EIS.

Table 6-7
List of Preparers

Name	Role/Responsibility
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Table 6-7
List of Preparers

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Table 6-7
List of Preparers

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Table 6-7
List of Preparers

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Chapter 7

References

Changes to Chapter 7 between draft and final EIS:

- Updated references.

CHAPTER 7

REFERENCES

- Abatzoglou, J. T. and C. A. Kolden. 2011. Climate change in western deserts: Potential for increased wildfire and invasive annual grasses. *Rangeland Ecology and Management* 64 (5):471-478.
- Agee, J. K. 1993. *Fire ecology of Pacific Northwest Forests*. Washington, DC: Island Press.
- Alberini, A., and J. Kahn. 2006. *Handbook on Contingent Valuation*. Edward Elgar, Northampton, MA.
- Aldrich, J. W. 1963. Geographic orientation of American tetraonidae. *Journal of Wildlife Management* 27:529-545.
- Aldridge, C. L., and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: Habitat-based approach for endangered greater sage-grouse. *Ecological Applications* 17:508-526.
- Aldridge, C. L., and R. M. Brigham. 2002. Sage-grouse nesting and brood habitat use in southern Canada. *Journal of Wildlife Management* 66:433-444.
- _____. 2003. Distribution, status and abundance of Greater Sage-Grouse, *Centrocercus urophasianus*, in Canada. *Canadian Field Naturalist* 117:25-34.
- Aldridge, C. L., S. E. Nielsen, H. L. Beyer, M. S. Boyce, J. W. Connelly, S. T. Knick, and M. A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. *Diversity and Distributions* 14:983-994.
- Aldridge, C. L. 2000. **R**eproduction and habitat use by Sage Grouse (*Centrocercus urophasianus*) in a northern fringe population. Master's thesis. University of Regina. Regina, SK, Canada. Alliance for Green Heat. 2011. 2010 Census shows wood is fastest growing heating fuel in US: Rural low-income families the new growth leaders in renewable energy production. Internet website: <http://www.forgreenheat.org/resources/press.pdf>.

- Ambrose, S., and C. Florian. 2013. Sound Levels of Gas Field Activities at Greater Sage-Grouse Leks, Pinedale Anticline Project Area, Wyoming. Prepared for Wyoming Game and Fish Department Cheyenne, WY.
- Amstrup, S. C., and R. L. Phillips. 1977. Effects of Coal Extraction and Related Development on Wildlife Populations: Effects of Coal Strip Mining on Habitat Use, Activities and Population Trends of Sharp-Tailed Grouse (*Pedioecetes phasianellus*). Annual progress report. Denver Wildlife Research Center. US Fish and Wildlife Service. Denver, Colorado.
- AOU (American Ornithologists' Union). 1983. *Check-list of North American Birds*, 6th ed. American Ornithologists' Union, Washington, DC.
- _____. 1998. *Check-list of North American Birds*, 7th ed. American Ornithologists' Union, Washington, DC.
- Arkle R. S., D. S. Pilliod, S. E. Hanser, M. L. Brooks, J. C. Chambers, J. B. Grace, K. C. Knutson, et al. 2014. Quantifying restoration effectiveness using multi-scale habitat models: implications for sage-grouse in the Great Basin. *Ecosphere* 5 (3): 1-32.
- Armentrout, D. J., and F. Hall (compilers). 2005. Conservation Strategy for Sage-Grouse (*Centrocercus urophasianus*) and Sagebrush Ecosystems within the Buffalo-Skedaddle Population Management Unit. Bureau of Land Management, Eagle Lake Field Office, Susanville, California.
- Armour, C. L., D. A. Duff, and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* 16(1): 7-11.
- Armstrong, J. C. 2007. Improving sustainable seed yield in Wyoming big sagebrush. Thesis. Brigham Young University, Provo, Utah.
- Arnold, G., and Dudzinski, M. 1978. *Ethology of Free-Living Domestic Animals*. Elsevier, Amsterdam, The Netherlands.
- Atamian, M. T., J. S. Sedinger, J. S. Heaton, and E. J. Blomberg. 2010. Landscape-level assessment of brood rearing habitat for greater sage-grouse in Nevada. *Journal of Wildlife Management* 74:1533-1543.
- Autenreith, R. E. 1981. Sage grouse management in Idaho. Wildlife Bulletin 9, Idaho Department of Fish and Game, Boise, ID.
- Babbitt, B. 1996. Record of Decision, Operation of Glen Canyon Dam. Final Environmental Impact Statement. US Department of the Interior, Washington, DC.
- Baker, W. L. 2006. Fire and restoration of sagebrush ecosystems. *Wildlife Society Bulletin* 34:177-185.
- _____. 2009. *Fire Ecology in Rocky Mountain landscapes*. Island Press, Washington DC.

- _____. 2011. Pre-Euro-American and recent fire in sagebrush ecosystems. In: S. T. Knick and J. W. Connelly (editors). *Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats*. University of California Press, Berkeley. Pp. 185-201.
- Balch, J. K., B. A. Bradley, C. M. D'Antonio, and J. Gómez-Dans. 2012. Introduced annual grass increases regional fire activity across the arid western USA (1980-2009). *Global Change Biology* 19:173-183.
- Baldwin, Donald. 1970. Bird Feathers from Hogup Cave. In: *Hogup Cave*, C. Melvin Aikens (editor), Anthropological Papers No. 93. University of Utah Press, Salt Lake City. pp. 267-269.
- Baldwin, C. K., F. H. Wagner, and U. Lall. 2003. Water Resources. In: F. H. Wagner (editor), *Rocky Mountain/Great Basin Regional Climate-Change Assessment* pp. 79-112.
- Bartlett, T., L. A. Torell, N. Rimbey, L. van Tassell, and D. McCollum. 2002. Valuing Grazing on Public Land. *Journal of Range Management* 55: 426-438.
- Barnett, J. K., and J. A. Crawford. 1994. Pre-laying nutrition of sage grouse hens in Oregon. *Journal of Range Management* 47:114-118.
- Barnes, Timothy. 2015. BLM Oregon/Washington Office. Email with author. March 26, 2015.
- Bartmann, R. M., G. C. White, L. H. Carpenter, and R. A. Garrott. 1987. Aerial mark-recapture estimates of confines mule deer in pinyon-juniper woodland. *Journal of Wildlife Management* 51: 41-46.
- Baruch-Mordo, Sharon, Jeffrey S. Evans, John P. Severson, David E. Naugle, Jeremy D. Maestas, Joseph M. Kiesecker, Michael J. Falkowski, et al. 2013. Saving sage-grouse from the trees: A proactive solution to reducing a key threat to a candidate species. *Biological Conservation* 167:233-241.
- Batchelor, J. L., W. J. Ripple, and T. M. Wilson. 2015. Restoration of riparian areas following the removal of cattle in the Northwestern Great Basin. *Environmental Management*; DOI 10.1007/s00267-014-0436-2
- Baxter, R. J., J. T. Flinders, and D. L. Mitchell. 2008. Survival, movements, and reproduction of translocated Greater Sage-Grouse in Strawberry Valley. *Journal of Wildlife Management* 72:179-186.
- BEA (Bureau of Economic Analysis, US Department of Commerce). 2012a. Local area personal income and employment methodology. Internet website: <http://www.bea.gov/regional/pdf/lapi2010.pdf>.
- _____. 2012b. Regional Economic Information System, local area personal income and employment. Internet website: <http://www.bea.gov/regional/index.htm>.
- _____. 2013. Widespread economic growth in 2012 (Table 4, Current-Dollar GDP by State). Internet website: https://www.bea.gov/newsreleases/regional/gdp_state/2013/pdf/gsp0613.pdf. Accessed on June 2013.

- Beck, T. D. I. 1977. Sage grouse flock characteristics and habitat selection in winter. *Journal of Wildlife Management* 41:18-26.
- Beck, J. L., and D. L. Mitchell. 2000. Influences of livestock grazing on sage grouse habitat. *Wildlife Society Bulletin* 28:993-1002.
- Beck, J. L., J. W. Connelly, and K. P. Reese. 2009. Recovery of greater sage-grouse habitat features in Wyoming big sagebrush following prescribed fire. *Restoration Ecology* 17:393-403.
- Becker, J. M., C. A. Duberstein, J. D. Tagestad, J. L. Downs. 2009. Sage-Grouse and Wind Energy: Biology, Habits, and Potential Effects from Development. Prepared for the US Department of Energy by Pacific Northwest Energy. PNNL-18567.
- Bedell, Thomas E. 1998. Glossary of Terms Used in Range Management. Society for Range Management. Denver, Colorado.
- Beever, E. A. 1999. Species- and community-level responses to disturbance imposed by feral horse grazing and other management practices. Dissertation, University of Nevada, Reno.
- _____. 2003. Commentary: Management implications of the ecology of free-roaming horses in semi-arid ecosystems of the western United States. *Wildlife Society Bulletin* 31(3):887-895.
- Beever, E. A., and C. L. Aldridge. 2011. Influences of free-roaming equids on sagebrush ecosystems, with a focus on greater sage-grouse. In: S. T. Knick and J. W. Connelly (editors), *Greater Grouse: Ecology and Conservation of a Landscape Species and Its Habitats*. Studies in Avian Biology 38. University of California Press. Berkeley. Pp. 273-290.
- Beever, E. A. and P. F. Brussard. 2000. Examining Ecological Consequences of Feral Horse Grazing using Exclosures. *Western North American Naturalist*: 60(3): 236-254.
- Beever, E. A., R. J. Tausch, and P. F. Brussard. 2003. Characterizing disturbance in semiarid ecosystems across broad spatial scales using multiple indices. *Ecological Applications* 13:113-136.
- Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil crusts: Ecology and management. US Department of the Interior. Tech. Ref. 1730-2.
- Bend Bulletin. 2015. Online news article: Two solar arrays proposed east of Bend. Published April 14, 2015.
- Bengston, Ginny. 2006. Bureau of Land Management Winnemucca Field Office Resource Management Plan/Environmental Impact Statement Final Ethnographic Assessment. Report on file with the Winnemucca District Office, Nevada.
- _____. 2010. Ethnographic Assessment for the Newe (Western Shoshone): Proposed Ruby Pipeline Project in Nevada. Report on file with the Bureau of Land Management Winnemucca District Office, Nevada.

- Berger, J. 1986. *Wild Horses of the Great Basin: Social Competition and Population Size*. University of Chicago Press, Chicago, Illinois.
- Bergquist, E., P. Evangelista, T. J. Stohlgren, and N. Alley. 2007. "Invasive species and coal bed methane development in the Powder River Basin, Wyoming." *Environmental Monitoring and Assessment* 128:381-394.
- Beschta, R. L., R. E. Bilby, G. W. Brown, L. B. Holtby, and T. D. Hofstra. 1987. "Stream temperature and aquatic habitat: fisheries and forestry interactions." *Streamsides Management: Forestry and Fishery Interaction*. University of Washington, College of Forest Research, Seattle. Pp. 191-232.
- Beschta, Robert L., Debra L. Donahue, Dominick A. DellaSala, Jonathan J. Rhodes, James R. Karr, Mary H. O'Brien, Thomas L. Fleischner, and Cindy Deacon Williams. 2012. Adapting to Climate Change on Western Public Lands: Addressing the Ecological Effects of Domestic, Wild and Feral Ungulates. Environmental Management. DOI 10.1007/s00267-012-9964-9.
- Bestelmeyer, Brandon T., Joel R. Brown, Kris M. Havstad, Robert Alexander, George Chavez, and Jeffrey Herrick. 2003. Development and use of state-and-transition models for rangelands. *Journal of Range Management* 56:114-126.
- Betchelor et al. 2015. Jonathan L. Batchelor, William J. Ripple, Todd M. Wilson, and Luke E. Painter. 2015. Restoration of Riparian Areas Following the Removal of Cattle in the Northwestern Great Basin. *Environmental Management*. DOI 10.1007/s00267-014-0436-2, February 19, 2015.
- BIA (US Department of the Interior, Bureau of Indian Affairs). 2012. BIA 2012 Tribal Entities List. Internet website: <http://www.bia.gov/WhoWeAre/BIA/OIS/TribalGovernmentServices/TribalDirectory/>. Accessed September 5, 2013.
- Blackburn, W. H., P. T. Tueller. 1970. Pinyon and juniper invasion in black sagebrush communities in east central Nevada. *Ecology* 51:841-848.
- Blaisdell, J. P., R. B. Murray, and E. D. McArthur. 1982. Managing Intermountain Rangelands-Sagebrush Steppe Ranges. US Forest Service General Technical Report INT-134. Ogden, Utah.
- Blank, R. R., R. H. White, and L. H. Ziska. 2006. Combustion properties of *Bromus tectorum* L.: influence of ecotype and growth under four CO₂ concentrations. *International Journal of Wildland Fire* 15: 227-236.
- Blank, R. R., and T. A. Morgan. 2012. Cheatgrass invasion 'engineers' the soil to facilitate its growth. Abstract. *Society for Range Management*. 65:0162.
- Blickley, J. L, and G. L. Patricelli. 2013. *Noise monitoring recommendations for Greater Sage- Grouse habitat in Wyoming*. Prepared for the PAPA, Pinedale, WY.
- BLM (United States Department of the Interior, Bureau of Land Management). 1969. Habitat Management Plan: Disaster Peak Wildlife Habitat Area. Paradise Resource Area. Winnemucca District Office, Nevada.

-
- _____. 1974. Revised Aquatic Habitat Management Plan: Mahogany Creek Habitat Area. Winnemucca District Office, Nevada. December 1974.
- _____. 1975. Sonoma Mountain Habitat Management Plan. Sonoma-Gerlach Resource Area. Winnemucca District Office, Winnemucca, Nevada. July 1975.
- _____. 1976. Owyhee Desert Habitat Management Plan. Surprise Field Office.
- _____. 1978. Fox Mountain-Granite Range Habitat Management Plan. Sonoma-Gerlach Resource Area. Winnemucca District Office, Nevada. Revised 1989.
- _____. 1980. Jackson Mountains Wildlife Habitat Management Plan. Paradise-Denio Resource Area. Winnemucca District Office, Nevada.
- _____. 1981. Pine Forest Habitat Management Plan. Sonoma-Gerlach Resource Area. Winnemucca District Office, Nevada.
- _____. 1982a. Paradise Denio Management Framework Plan. Winnemucca District Office, Nevada.
- _____. 1982b. Sonoma-Gerlach Management Framework Plan. Winnemucca District Office, Nevada.
- _____. 1982c. Aquatic Habitat Management Plan: North Fork, Little Humboldt River. Winnemucca District Office, Nevada. October 1982.
- _____. 1983. Soldier Meadows Desert Dace Habitat Management Plan. Winnemucca District Office, Nevada.
- _____. 1984. Manual 8400—Visual Resource Management. Rel. 8-24. BLM, Washington, DC. April 5, 1984.
- _____. 1985a. Wells Resource Management Plan. Elko District Office, Nevada. July 1985.
- _____. 1985b. Sonoma Creek Aquatic Management Plan. Sonoma-Gerlach Resource Area. Winnemucca District Office, Nevada.
- _____. 1985c. Northwest Area Noxious Weed Control Program, Final Environmental Impact Statement. Washington, DC.
- _____. 1986a. Shoshone-Eureka Resource Management Plan. Mt. Lewis Field Office, Battle Mountain District, Battle Mountain, NV, March 1986.
- _____. 1986b. Handbook H-8410-1—Visual Resource Inventory. Rel. 8-28. Washington, DC. January 17, 1986.
- _____. 1986c. Handbook H-8431-1—Visual Resource Contrast Rating. Rel. 8-30. Washington, DC. January 17, 1986.

-
- _____. 1986d. Northwest Area Noxious Weed Control Program Environmental Impact Statement Record of Decision. Washington, DC.
- _____. 1987a. Elko Resource Management Plan. Elko District Office, Nevada. March 1987.
- _____. 1987b. Shoshone-Eureka RMP Amendment. Battle Mountain Field Office, Nevada.
- _____. 1987c. Pine Dunes Research Natural Area Management Plan. Susanville District Office, California.
- _____. 1987d. Shoshone-Eureka Wilderness Recommendations. Battle Mountain District Office, Nevada. February 3, 1987.
- _____. 1987e. Little Owyhee-Snowstorm Habitat Management Plan. Paradise-Denio Resource Area. Winnemucca District Office, Nevada.
- _____. 1987f. Pine Nut Habitat Management Plan. Carson City District Office, Carson City, Nevada.
- _____. 1987g. BLM Manual H-4120-1: Grazing Management. Rel. 4-85. Washington, DC. August 24, 1987.
- _____. 1988a. Shoshone-Eureka Rangeland Program Summary. Battle Mountain District, Nevada. December 1988.
- _____. 1988b. Policy Manual 1613—Areas of Critical Environmental Concern. Washington, DC. September 29, 1988.
- _____. 1989. North Eccles pronghorn management plan. US BLM, Elko, Nevada.
- _____. 1990a. Handbook H-1624-1—Planning for Fluid Mineral Resources. Washington, DC. May 1990.
- _____. 1990b. Condor Canyon Habitat Management Plan: Las Vegas, Nevada, Caliente Resource Area. N5-WHA-T27. Las Vegas District Office.
- _____. 1990c. Habitat Management Plan: Montana-Double H Wildlife Habitat Area. Paradise-Denio Resource Area. Winnemucca District Office, Nevada. November 1990.
- _____. 1990d. Manual 8160—Native American Coordination and Consultation. Rel. 8-58. Washington, DC. January 26, 1990.
- _____. 1990e. Handbook H-1741-1, Fencing.
- _____. 1990f. Handbook H-1741-2, Water Developments.
- _____. 1991a. Vegetation Treatment on BLM Lands in Thirteen Western States. Washington, DC.
- _____. 1991b. Eagle Lake Basin Plan. Eagle Lake Field Office, Susanville, California.
- _____. 1991c. Riparian-Wetland Initiative for the 1990s. BLM/WO/GI-91/001+4340.

-
- _____. 1991d. Record of Decision for California Statewide Wilderness Study Report. California State Office, Sacramento, CA.
- _____. 1991e. Record of Decision for the Nevada Statewide Wilderness Study Report. Nevada State Office, Reno, NV.
- _____. 1992a. Pine Forest Recreation Management Plan. Winnemucca District Office, Nevada. September 1992.
- _____. 1992b. Manual 9015—Integrated Weed Management. Washington, DC. December 2, 1992.
- _____. 1994. Handbook H-8160—General Procedural Guidance for Native American Consultation. Rel. 8-65. Washington DC. November 3, 1994.
- _____. 1996. Partners Against Weeds; Final Action Plan for the Bureau of Land Management, Denver Federal Center, Denver, CO, January 1996.
- _____. 1997a. Tonopah Resource Management Plan. Battle Mountain District Office, Nevada. October 1997.
- _____. 1997b. Geothermal Leasing—Tonopah Planning Area. Battle Mountain District Office, Nevada. October 1997.
- _____. 1997c. Water Canyon Recreation Area Environmental Assessment, Management Plan, Record of Decision and Cooperative Management Agreement. Winnemucca District Office, Nevada. August 15, 1997.
- _____. 1997d. Standards for Rangeland Health and Guidelines for Livestock Grazing Management. Idaho State Office, Boise.
- _____. 1998a. Standards for Rangeland Health and Guidelines for Livestock Grazing Management on BLM-Administered Lands in California and Northwestern Nevada, Final Environmental Impact Statement. California State Office, Sacramento, CA, April 1998.
- _____. 1998b. Central Nevada Communications Sites Amendment. Battle Mountain District Office, Nevada. August 21, 1998.
- _____. 1998c. Pulling Together: A National Strategy for Management of Invasive Plants. Federal Interagency Committee for Management of Noxious and Exotic Weeds. 2nd edition. US Government Printing Office, Washington, DC.
- _____. 1999. Desatoya Mountains Ecosystem Management Plan. Battle Mountain Field Office and Carson City Field Office, Nevada. July 7, 1999.
- _____. 2000. Interdisciplinary Management Plan for the Silver Saddle Ranch and the Ambrose Carson River Natural Area. Carson City Field Office, Carson City, Nevada. November 2000.

-
- _____. 2001a. Carson City Consolidated Resource Management Plan. Carson City Field Office, Nevada. May 2001.
- _____. 2001b. North Douglas County Specific Management Plan Amendment. Carson City Field Office, Nevada. June 2001.
- _____. 2001c. Southern Washoe County Urban Interface Plan Amendment. Carson City Field Office, Nevada. January 2001.
- _____. 2001d. Pine Forest Recreation Plan Activity Plan for Pine Forest Recreation Area. Winnemucca District Office, Nevada.
- _____. 2002a. Programmatic Environmental Assessment Geothermal Leasing and Exploration Shoshone-Eureka Planning Area. Battle Mountain Field Office, Nevada. August 2002.
- _____. 2002b. Geothermal Resources Leasing—Winnemucca District Office Programmatic Environmental Assessment. Winnemucca District Office, Nevada.
- _____. 2002c. Management Considerations for Sagebrush (*Artemisia*) in the Western United States: a selective summary of current information about the ecology and biology of woody North American sagebrush taxa. Washington, DC.
- _____. 2002d. Shoshone-Eureka RMP Amendment for Fire Management. Mt. Lewis Field Office, Battle Mountain District Office, Nevada.
- _____. 2002e. Aquatic Habitat Inventory and Monitoring Level III Survey Procedures—Transect Method. Elko Revised Handbook, BLM Manual 6720-I. Elko District Office, Nevada.
- _____. 2003a. Forestry Plan Amendment and Environmental Assessment. NV-020-02-05. Winnemucca District Office, Nevada. December 2003.
- _____. 2003b. Manual 620—Wildland Fire Management, Chapter 3, Interagency Burned Area Emergency Stabilization and Rehabilitation. Washington, DC. September 2003.
- _____. 2004a. Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area Resource Management Plan. Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area. Black Rock Field Office, Winnemucca District Office, July 2004.
- _____. 2004b. Carson City Field Office Fire Management Plan. Carson City District Office, Nevada.
- _____. 2004c. Normal Year Fire Rehabilitation Plan Programmatic Environmental Assessment and Record of Decision. Winnemucca District Office, Nevada. June 2004.
- _____. 2004d. BLM Conservation Efforts for Greater Sage-Grouse and Sagebrush Habitats. Report to the US Fish and Wildlife Service in response to notice of 90-day petition finding for the Greater Sage-Grouse. Washington, DC.

-
- _____. 2004e. Instruction Memorandum 2004-227, Bureau of Land Management's Biomass Utilization Strategy. Washington, DC. August 16, 2004.
- _____. 2004f. Manual 8110—Identifying and Evaluating Cultural Resources. Rel. 8-73. Washington, DC. December 3, 2004.
- _____. 2004g. Handbook H-8120-1—Guidelines for Conducting Tribal Consultation. Rel. 8-75. Washington, DC. December 3, 2004.
- _____. 2005a. Handbook H-1601-1—Land Use Planning Handbook. Rel. 1-1693. Washington, DC. March 11, 2005.
- _____. 2005b. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11. June 2005.
- _____. 2005c. Oil and Gas Resources Leasing Environmental Assessment and Record of Decision. Winnemucca District Office, Nevada. October 2005.
- _____. 2005d. Water Canyon Implementation Plan Amendment Environmental Assessment and Decision Record. Winnemucca District Office, Nevada. August 2005.
- _____. 2005e. December 2005 Oil and Gas Lease Sale. Programmatic Environmental Assessment (BLM/EK/PL-2005/030). Elko District BLM, Elko, Nevada.
- _____. 2006. Oil and Gas Leasing within Portions of the Shoshone-Eureka Planning Area, Bureau of Land Management, Battle Mountain District, Environmental Assessment NV063-EA06-092. FONSI and Record of Decision. November 27, 2006.
- _____. 2007a. Final Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement and Associated Record of Decision. Washington, DC. September 2007.
- _____. 2007b. Denton-Rawhide Mine Land Sale Plan Amendment. EA-NV-030-07-021. Carson City Field Office, Nevada. August 2007.
- _____. 2007c. Handbook H-1742-1: Burned Area Emergency Stabilization and Rehabilitation. Washington, DC. February 12, 2007.
- _____. 2007d. Ely Proposed Resource Management Plan/Final Environmental Impact Statement. Internet website: http://www.blm.gov/nv/st/en/fo/ely_field_office/blm_programs/planning/ely_rmp_2007.html.
- _____. 2007e. Eagle Lake Field Office—Proposed Resource Management Plan and Final Environmental Impact Statement. Internet website: <http://www.blm.gov/ca/st/en/fo/eaglelake/propRMP-FEIS.html>.
- _____. 2007f. Surprise Field Office—Proposed Resource Management Plan and Final Environmental Impact Statement. Internet website: <http://www.blm.gov/ca/st/en/fo/surprise/propRMP-FEIS.html>.

-
- _____. 2008a. Alturas Resource Management Plan. Alturas Field Office, California. April 2008.
- _____. 2008b. Eagle Lake Resource Management Plan. Eagle Lake Field Office, Susanville, California. April 2008.
- _____. 2008c. Surprise Resource Management Plan. Surprise Field Office, Cedarville, California. April 2008.
- _____. 2008d. Ely Resource Management Plan. Ely District Office, Nevada. August 2008.
- _____. 2008e. Handbook H-1790-1—NEPA Handbook. Rel. 1-1710. Washington, DC. January 30, 2008.
- _____. 2008f. Sage Steppe Ecosystem Restoration Strategy Final EIS. Alturas Field Office, California. December 15, 2008.
- _____. 2008g. Oil and Gas Leasing within the Western Portion of the Shoshone-Eureka Planning Area, Bureau of Land Management, Battle Mountain District, Environmental Assessment NV063 EA08-032. March 2008.
- _____. 2008h. Geothermal Resources Leasing in Churchill, Mineral, and Nye Counties, Nevada. Carson City Field Office, Nevada. March 2008.
- _____. 2008i. Instruction Memorandum 2009-043—Wind Energy Development Policy. Washington, DC. December 19, 2008.
- _____. 2008j. Handbook 1740-2—Integrated Vegetation Management. Washington, DC. March 25, 2008.
- _____. 2009a. Approved Resource Management Plan Amendments/Record of Decision (ROD) for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States. Washington, DC. January 2009.
- _____. 2009b. Environmental Assessment Integrated Weed Management Program. EA Number CA320-07-13. Alturas Field Office, California.
- _____. 2009c. Instruction Memorandum 2009-120—Bureau of Land Management (BLM) Updated Contract Clause for Utilization of Woody Biomass. Washington, DC. May 12, 2009.
- _____. 2010a. Carson City District 2011 Geothermal Leasing. DOI-BLM-NV-C010-2010-0020-EA. Carson City District, Nevada. October 2010.
- _____. 2010b. Final Environmental Impact Statement for Vegetation Treatments Using Herbicides on BLM Lands in Oregon. USDI, Bureau of Land Management, Portland, Oregon. Internet website: www.blm.gov/or/plans/vegtreatmentseis/.
- _____. 2010c. Instruction Memorandum 2011-061—Solar and Wind Applications—Pre-Application and Screening. Washington, DC. October 2010.

-
- _____. 2010d. Instruction Memorandum 2011-060—Solar and Wind Applications—Due Diligence. Washington, DC. October 2010.
- _____. 2010e. Winnemucca District Office – Draft Resource Management Plan/Environmental Impact Statement. Internet website: http://www.blm.gov/nv/st/en/fo/wfo/blm_information/rmp/draft_rmp_eis.html.
- _____. 2011a. BLM Instructional Memorandum 2012-44—BLM National Greater Sage-Grouse Land Use Planning Strategy. BLM Washington Office, Washington DC. December 27, 2011.
- _____. 2011b. Nobles Trail/Humboldt Wagon Road Management Plan, Shasta and Lassen Counties, California, and Pershing and Washoe Counties, Nevada. Eagle Lake Field Office, Susanville, California.
- _____. 2011c. Handbook H-1730-1—Resource Management During Drought. Chapter 2. Washington, DC.
- _____. 2011d. Bureau of Land Management, Nevada State Office. Sensitive Species List. October 2011.
- _____. 2011e. BLM Manual 8320—Planning for Recreation and Visitor Services (Public). Release 8-81. Washington, DC. March 29, 2011.
- _____. 2011f. BLM Manual 1626—Travel and Transportation Manual. Release 1-1731. Washington, DC. July 14, 2011.
- _____. 2011g. Instruction Memorandum 2011-059—National Environmental Policy Act Compliance for Utility-Scale Renewable Energy Right-of-Way Authorizations. Washington, DC. February 7, 2011.
- _____. 2011h. Instruction Memorandum 2011-003—Solar Energy Development Policy. Washington, DC. October 7, 2010.
- _____. 2011i. Supplement to the Draft Programmatic EIS for Solar Energy Development in Six Southwestern States. Washington State Office, Washington DC. October 2011.
- _____. 2011j. Battle Mountain District Office – Socioeconomic Baseline Assessment Report. Internet website: http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/battle_mountain_field/blm_information/rmp.Par.7232.File.dat/BMDO_SE_FINAL_112111.pdf.
- _____. 2012a. Instruction Memorandum 2012-169—RMP Alternative Development for Livestock Grazing. Washington, DC.
- _____. 2012b. Manual 6340—Management of Designated Wilderness Areas. Rel. 6-135. Washington, DC. July 13, 2012.
- _____. 2012c. BLM Manual 6220—National Monuments, National Conservation Areas, and Similar Designations. Washington, DC.

-
- _____. 2012d. BLM Manual 6400—Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management. Washington, DC.
- _____. 2012e. BLM Manual 6280—Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation. Washington, DC.
- _____. 2012f. BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands. Rel. 6-129. Washington, DC. March 15, 2012.
- _____. 2012g. BLM Manual 6320—Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process. Rel. 6-130. Washington, DC. March 15, 2012.
- _____. 2012h. Approved Resource Management Plan Amendments and Record of Decision for Solar Energy Development in Six Southwestern States. Washington, DC. October 2012.
- _____. 2012i. BLM Northern California Region Fire Management Plan.
- _____. 2012j. Battle Mountain Drought Environmental Assessment. DOI-BLM-NV-B000-2012-0005-EA. Battle Mountain District, Nevada. June 14, 2012.
- _____. 2012k. Manual 6330—Management of Wilderness Study Areas. Rel. 6-134. BLM, Washington, DC. July 13, 2012.
- _____. 2012l. Data from BLM Rangeland Administration System.
- _____. 2012m. BLM Handbook 8342—Travel and Transportation. Release 8-82. Washington, DC. March 16, 2012.
- _____. 2012n. September 2012 Competitive Oil and Gas Lease Sale Environmental Assessment. DOI-BLM-NV-L000-2012-0003-EA. Ely District Office, Nevada. April 13, 2012.
- _____. 2012o. Summary of Nevada-Northeast California Sub-Region Economic Strategies Workshop: Carson City, Nevada, June 28, 2012.
- _____. 2012p. Recreation Management Information System.
- _____. 2012q. BLM Defers Final Decision on China Mountain Wind Project. Internet website: http://www.blm.gov/id/st/en/info/newsroom/2012/March-2012_News/idaho_blm_defers_final.html.
- _____. 2012r. Biomass. California. Internet website: <http://www.blm.gov/ca/st/en/prog/energy/biomass.html>.
- _____. 2012s. FY2011 BLM Expenditures: FY2011 BLM Labor Summary and FY2011 BLM Non-Labor Summary.
- _____. 2012t. North Elko Pipeline Project. Environmental Assessment DOI-BLM-NV-N020- 2012-0018-EA. Elko District BLM, Elko, Nevada.

-
- _____. 2012u. BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands. Rel. 6-129. BLM, Washington, DC. March 15, 2012.
- _____. 2012v. Recreation Management Information System. Report 26, Visitor Days and Participants by Office and Activity. US Department of the Interior, Washington, DC.
- _____. 2013a. BLM Burns District Greater Sage-Grouse Fence Collision Analysis. Produced by The Nature Conservancy of Oregon. BLM Cooperative Agreement No. L12AC20615, 2012. August 26, 2013.
- _____. 2013b. Carson City District Drought Management Plan, Carson City District Office, NV.
- _____. 2013c. Land and Mineral Legacy Rehost 2000 System (LR2000).
- _____. 2013d. Carson City District Resource Management Plan and Environmental Impacts Statement. Socioeconomic Baseline Assessment Report. Internet website: [https://www.blm.gov/epl-front-office/projects/lup/22652/42252/44902/CCD_SEbaseline_20130111_508_\(2\).pdf](https://www.blm.gov/epl-front-office/projects/lup/22652/42252/44902/CCD_SEbaseline_20130111_508_(2).pdf).
- _____. 2013e. BLM California Wind Applications and Authorizations. Internet website: <http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/energy.Par.5556.File.dat/BLMWindApplications&AuthorizationsApril2013.pdf>.
- _____. 2013f. Grazing Impacts. Personal communication. Mike Tietmeyer, Rangeland Management Specialist, . Nevada State Office, Reno, NV, May and June 2013.
- _____. 2013g. Oil and Gas Data. Data provided in personal communication from John Menghini, Petroleum Engineer, BLM, May and June 2013 and Jan 2014.
- _____. 2013h. Locatable, Salable, and Solid Leasable Minerals. Personal communication. Scott Murrellwright, Geologist, Nevada State Office, Reno, NV, May and June 2013.
- _____. 2013i. Long Draw/Miller Homestead Fire Review. Vale and Burns Districts. April 2013.
- _____. 2013j. Geothermal RFD. Personal communication. Sheila Mallory, Geologist, Nevada State Office. Reno, NV, June 2013.
- _____. 2013k. Solar and Wind Information. Personal communication. Wendy Seley, Nevada State Office, Reno, NV, May 2013.
- _____. 2013l. Wind-Based Energy Projects. Bureau of Land Management, Nevada, Ely Field Office. Internet website: http://www.blm.gov/nv/st/en/fo/ely_field_office/blm_programs/energy/wind-based_energy.print.html.
- _____. 2013m. Active Geothermal Projects—Nevada. Internet website: http://www.blm.gov/style/medialib/blm/nv/minerals/geothermal/projects.Par.77901.File.dat/geothermal_energy_projects_table.pdf.

-
- _____. 2013n. Interagency Standards for Fire and Fire Aviation Operations. US Department of the Interior, Bureau of Land Management. Washington, DC.
- _____. 2014a. Instruction Memoranda - Sage-Grouse Habitat and Wildland Fire Management IM (WO IM-2014-114).
- _____. 2014b. Instruction Memoranda – Completion of Wildfire and Invasive Species Assessment in Great Sage Grouse Habitat (WO IM 2014-134).
- _____. 2014c. Personal communication with BLM mineral specialists.
- _____. 2015a. Geographic Information Systems Data. National Operations Center, Denver, Colorado.
- _____. 2015b. Geothermal Data. Data provided in personal communication between Lorenzo Trimble, BLM, Nevada State Office, and Alex Uriarte, ICF, March 2015.
- _____. 2015c. LR 2000 report run February 19, 2015.
- BLM (US Department of the Interior, Bureau of Land Management) and DOE (US Department of Energy). 2003. Assessing the Potential for Renewable Energy on Public Lands. February 2003. Internet website: <http://www.nrel.gov/docs/fy03osti/33530.pdf>.
- BLM and Forest Service (US Department of the Interior, Bureau of Land Management, and US Department of Agriculture, Forest Service). 2006. Memorandum of Understanding Concerning Oil and Gas Leasing Operations.
- _____. 2008. Final Programmatic Environmental Impact Statement and Record of Decision for Geothermal Leasing in the Western United States. Website: http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide.html. Accessed on September 1, 2013.
- _____. 2011. Memorandum of Understanding Concerning Greater Sage-Grouse.
- _____. 2012a. Allotment data.
- _____. 2012b. National Greater Sage-Grouse Planning Strategy: Land Use Plan Amendments and Environmental Impact Statements, Scoping Summary Report. May 2012.
- BLM and Forest Service (US Department of the Interior, Bureau of Land Management, and US Department of Agriculture, Forest Service) GIS. 2013. GIS data created in the analysis of the alternatives, affected environment, and impact analysis on the BLM's eGIS server, using data from the Department of the Interior, Nevada State Office and California Alturas, Eagle Lake, and Surprise Field Offices, and the Humboldt-Toiyabe National Forest. March-August 2013.
- _____. 2015. GIS data created and edited in the analysis of the alternatives, affected environment, and impact analysis on the BLM's eGIS server, using data from the Department of the Interior, Nevada State Office and California Alturas, Eagle Lake, and Surprise Field Offices, and the Humboldt-Toiyabe National Forest. January-May 2015.

- BLM and Forest Service and US Environmental Protection Agency. 2011. Memorandum of Understanding Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the National Environmental Policy Act Process. June 23, 2011.
- BLM and National Landscape Conservation System. 2006. National Scenic and Historic Trails Program. Washington, DC.
- BLM and Nevada Department of Environmental Protection. 2004. MOU for Water Quality Management Activities within the State of Nevada. September 2004.
- BLM and US Navy (Department of Defense). 2000. Fallon Range Training Complex Requirements EIS. Carson City and Naval Air Station Fallon, Nevada. April 14, 2000.
- Blomberg, E. J., J. S. Sedinger, M. T. Atamian, and D. V. Nonne. 2012. Characteristics of climate and landscape disturbance influence the dynamics of greater sage-grouse populations. *Ecosphere* 3(6):55. <http://dx.doi.org/10.1890/ES11-00304>.
- BLS (US Bureau of Labor Statistics). 2012a. CPI Inflation Calculator. Internet website: http://www.bls.gov/data/inflation_calculator.htm/.
- _____. 2012b. Local Area Unemployment Statistics. Internet website: <http://www.bls.gov/lau/data.htm>.
- _____. 2014. Local Area Unemployment Statistics. Internet website: <http://www.bls.gov/lau/data.htm>.
- Boarman, W. I., and B. Heinrich. 1999. Common Raven. In: A. Poole and F. Gill (editors), *The Birds of North America*, No. 476. The Birds of North America, Inc., Philadelphia, Pennsylvania.
- Booth, M. S., M. M. Caldwell, and J. M. Stark. 2003. Overlapping resource use in three Great Basin species: implications for community invisibility and vegetation dynamics. *Journal of Ecology*, 91(1):36-48.
- Bonier et al 2009. Bonier, F., P. R. Martin, I. T. Moore, and J. C. Wingfield. 2009. Do baseline glucocorticoids predict fitness? *Trends in Ecology and Evolution* 24:634–642.
- Bowker, J. M., M. Starbuck, D. English, J. Bergstrom, R. Rosenberger, and D. McCollum. 2009. Estimating the Net Economic Value of National Forest Recreation: An Application of the National Visitor Use Monitoring Data. Faculty Series Working Paper, FS-09-02. Department of Agricultural and Applied Economics, University of Georgia, Athens, GA.
- Bowker, J. M., D. B. K. English, and H. K. Cordell. 1999. Projections of Outdoor Recreation Participation to 2050. In: *Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends* (ed. H. K. Cordell). Sagamore Publishing.
- Bowker, J. M., and J. R. Stoll. 1988. Use of dichotomous choice nonmarket methods to value the whooping crane resource. *American Journal of Agricultural Economics* 70:372–381.
- Bradbury, J. W., R. M. Gibson, C. E. McCarthy, and S. L. Vehrencamp. 1989. Dispersion of displaying male sage grouse: II. The role of female dispersion. *Behavioral Ecology and Sociobiology* 24:15-24.

- Bradley, B. A. 2010. Assessing ecosystem threats from global and regional change: Hierarchical modeling of risk to sagebrush ecosystems from climate change, land use and invasive species in Nevada, USA. *Ecography* 33:198-208.
- Bradley, B. A., and J. F. Mustard. 2006. Characterizing the landscape dynamics of an invasive plant and risk of invasion using remote sensing. *Ecol. Appl.* 16:1132-1147.
- Braun, C. E. 1995. Distribution and status of sage grouse in Colorado. *Prairie Naturalist*. 27:1-9.
- _____. 1998. Sage grouse declines in western North America: What are the problems? In: Proceedings of the Western Association of State Fish and Wildlife Agencies (Western Association of Fish and Wildlife Agencies). Pp. 139-156.
- Braun, C. E., M. F. Baker, R. L. Eng, J. W. Gashwiler, and M. H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communities on the associated avifauna. *Wilson Bulletin* 88:165-171.
- Braun, C. E., O. O. Oedekoven, and C. L. Alderidge. 2002. Oil and gas development in western North America: Effects on sagebrush steppe avifauna with particular emphasis on Sage Grouse. *Transactions of the North American Wildlife and Natural Resources Conference* 67:337-349.
- Briske, D. D., J. D. Derner, D. G. Milchunas, and K. W. Tate. 2011. An evidence-based assessment of prescribed grazing practices. In: D. D. Briske. Conservation Benefits of Rangeland Resources: Assessment, Recommendations, and Knowledge Gaps. USDA National Resources Conservation Service, Washington, DC. Pp. 23-74.
- Brooks, M. L., and D. A. Pyke. 2001. Invasive plants and fire in the deserts of North America. In: K. E. M. Galley and T. P. Wilson (editors). Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species. *Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management*. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, Florida. Pp. 1-14.
- Brooks, M. L., C. M. D'Antonio, D. M. Richardson, J. B. Grace, J. E. Keeley, J. M. DiTomaso, R. J. Hobbs, M. Pellant, and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. *BioScience* 54:677-688.
- Brown, G. W. 1983. *Forestry and water quality*. Oregon State University Bookstore, Inc., Corvallis.
- Brown, K. G., and K. M. Clayton. 2004. Ecology of the Greater Sage-Grouse (*Centrocercus urophasianus*) in the Coal Mining Landscape of Wyoming's Powder River Basin. Final Executive Summary Report. Thunder River Wildlife Consulting, Gillette, Wyoming.
- Brown, G. W., and J. T. Krygier. 1970. Effects of clearcutting on stream temperature. *Water Resources Research* 6:1133-1139.
- Brown, J. K. 1982. Fuel and fire behavior prediction in big sagebrush. US Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. Research Paper INT-290. Ogden, Utah.

- _____. 1995. Fire regimes and their relevance to ecosystem management. *In: Proceedings of Society of American Foresters National Convention, September 18-22, 1994.* Pp. 171-178.
- Brown, T. J., B. L. Hall, and A. L. Westerling. 2004. The impact of twenty-first century climate change on wildland fire danger in the western United States: An applications perspective. *Climate Change* 62:365-388.
- Brown, James K., and Jane Kapler Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Bryant, L. D. 1985. Livestock management in the riparian ecosystem. Paper presented to North American Conference, University of Arizona, Tucson. April 16-18, 1985.
- Budeau, Dave 2015. Personal communication between Dave Budeau, Upland Game Bird Coordinator with the Oregon Dept. of Fish and Wildlife and Morgan Triege, EMPSi. March 26, 2015.
- Bui, T. D., J. M. Marzluff, and B. Bedrosian. 2010. Common raven activity in relation to land use in western Wyoming: implications for greater sage-grouse reproductive success. *Condor* 112:65-78.
- Bui et al 2011. Contemporary Knowledge and Research Needs Regarding the Potential Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus* and *C. minimus*). Utah Wildlife in Need Report. Protocol for Investigating the Effects of Tall Structures on Sage-grouse (*Centrocercus spp.*) within Designated or Proposed Energy Corridors.
- Bunting, S. C. 1984. Fires in sagebrush-grass ecosystems: successional changes. *In: K. Sanders and J. Durham (editors), Rangeland Fire Effects: A Symposium.* USDI Bureau of Land Management, Boise, Idaho. Pp. 7-11.
- _____. 1990. Prescribed fire effects in sagebrush-grasslands and pinyon-juniper woodlands. *In: M. E. Alexander and G. F. Bisgrove (technical coordinators). The art and science of fire management.* Proceedings of the First Interior West Fire Council Annual Meeting and Workshop. Kananaskis Village, Alberta. Information report NOR-X-309. Forestry Canada, Northwest Region, Northern Forestry Centre. Edmonton, Alberta. October 24-27, 1988. Pp. 176-181.
- Bunting, S. C., B. M. Kilgore, C. L. Bushey. 1987. Guidelines for Prescribed Burning Sagebrush-Grass Rangelands in the Northern Great Basin. US Department of Agriculture, Forest Service Intermountain Research Station General Technical Report INT-231. Ogden, Utah.
- Burnham, K. P., and D. R. Anderson. 2002. Model selection and multimodel inference (2nd. ed.): New York, Springer.
- Burton, T. A., S. J. Smith, and E. R. Cowley. 2011. Riparian area management: Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23. BLM/OC/ST-10/003+1737+REV. US Department of the Interior, Bureau of Land Management, National Operations Center, Denver, Colorado.

- Cagney, J., E. Bainter, B. Budd, T. Christiansen, V. Herren, M. Holloran, B. Rashford, et al. 2010. Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat. *Cooperative Extension Service Bulletin B-1203*, University of Wyoming, Laramie.
- California Department of Conservation. 2010. Oil, Gas, and Geothermal – Assessment Process. Internet website: http://www.conservation.ca.gov/dog/for_operators/Pages/assessments.aspx.
- California Legislative Analyst's Office. 2007. California's tax system—A primer.
- California State Board of Equalization. 2012. California property tax. An overview. Publication 29, November. Internet website: <http://www.boe.ca.gov/proptaxes/pdf/pub29.pdf>.
- CalPIF (California Partners in Flight). 2005. Version 1.0. The sagebrush bird conservation plan: a strategy for protecting and managing sagebrush habitats and associated birds in California. PRBO Conservation Science, Stinson Beach, California. Internet website: <http://www.prbo.org/calpif/plans.html>.
- Carpenter, J., C. Aldridge, and M. S. Boyce. 2010. Sage-grouse habitat selection during winter in Alberta. *Journal of Wildlife Management* 74:1806-1814.
- Carson City. 2006. Carson City Master Plan. Carson City, Nevada. April 6, 2006.
- Carson, R. 2011. Contingent Valuation: A Comprehensive Bibliography and History. Edward Elgar, Northampton, MA.
- Casazza, M. L., P. S. Coates, and C. T. Overton. 2011. Linking habitat selection to brood success in greater sage-grouse. In: M. K. Sandercock, K. Martin, and G. Segelbacher (editors). *Ecology, Conservation, and Management of Grouse*. University of California Press, Berkeley. Pp. 151-167.
- Caughley, Graeme. 1974. Bias in Aerial Survey. *The Journal of Wildlife Management* Vol. 38, No. 4 (Oct. 1974). Pp. 921-933.
- CDFW (California Department of Fish and Wildlife). 2005. State Wildlife Action Plan. Sacramento, California.
- CEC (Commission for Environmental Cooperation). 2012. Invasive species. *The Northern American Mosaic: An Overview of Key Environmental Issues*. Commission for Environmental Cooperation document. Pp. 1-4.
- CEQ (Council on Environmental Quality). 1997a. CEQ Environmental Justice: Guidance Under the National Environmental Policy Act. US Council on Environmental Quality. Washington, DC. Internet website: http://www.epa.gov/compliance/ej/resources/policy/ej_guidance_nepa_ceq1297.pdf.
- _____. 1997b. Considering Cumulative Impacts under the National Environmental Policy Act. January 1997.

- Chambers, J. C. 2008. Invasive Plant Species and the Great Basin. USDA-USFS Rocky Mountain Research Station, Reno, Nevada. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-204.
- Chambers, Jeanne C. and Mike Pellant. 2008. Climate Change Impacts on Northwestern and Intermountain United States Rangelands. *Rangelands* 30(3):29-3.
- Chambers, Jeanne C.; David A. Pyke, Jeremy D. Maestas, Mike Pellant, Chad S. Boyd, Steven B. Campbell, Shawn Espinosa, et al. 2014. Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and greater sage-grouse: A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Chaney, E., W. Elmore, and W. S. Platts. 1993. Managing change, livestock grazing on western riparian areas. Produced for the Environmental Protection Agency by the Northwest Resource Information Center, Inc., Eagle, Idaho.
- Christiansen, T. 2009. Fence Marking to Reduce Greater Sage-Grouse Collisions and Mortality Near Farson, Wyoming—Summary of Interim Results. Wyoming Game and Fish Department, unpublished interim report.
- Churchill County. 2007. Water Resource Plan. Fallon, Nevada. October 8, 2003.
- _____. 2010. Churchill County Master Plan. Fallon, Nevada. September 2, 2010. Internet website: <http://www.churchillcounty.org/DocumentCenter/Home/View/1577>.
- City of Caliente. 2011. Envision Caliente: City of Caliente, Nevada Master Plan. Caliente, Nevada.
- City of Reno. 2012. Reno Economy. Internet website: <http://reno.gov/index.aspx?page=119>.
- Clark, L., J. Hall, R. McLean, M. Dunbar, K. Klenk, R. Bowen, and C. A. Smeraski. 2006. Susceptibility of greater sage-grouse to experimental infection with West Nile virus. *Journal of Wildlife Diseases* 42:14-42.
- Clary, W. P., and B. F. Webster. 1989. Managing Grazing of Riparian Areas in the Intermountain Region. General Technical Report INT-263. US Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah.
- CNIC (Commander Navy Installations Command). Undated. Naval Air Station Fallon, installation welcome page. Internet website: <http://www.cnic.navy.mil/Fallon/index.htm>. Accessed on September 9, 2013.
- Coates, P. S., and D. J. Delehanty. 2004. The effects of raven removal on sage-grouse nest success. *Proceedings Vertebrate Pest Conference* 21:17.
- _____. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. *Journal of Wildlife Management* 74(2):240-248.

- Coates, P. S. 2007. Greater sage-grouse (*Centrocercus urophasianus*) nest predation and incubation behavior. Doctoral dissertation, Idaho State University, Pocatello.
- _____. 2008. Effects of environmental factors on incubation patterns of Greater Sage-Grouse. *The Condor* 110:627-638.
- _____. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. *Journal of Wildlife Management* 74:240-248.
- _____. In prep. (C). Greater Sage-Grouse Population Growth Rate Modeling.
- Coates, P. S., Z. B. Lockyer, M. A. Farinha, J. M. Sweeney, V. M. Johnson, M. B. Meshriy, S. P. Espinosa, et al. 2011. Preliminary Analysis of Greater Sage-Grouse Reproduction in the Virginia Mountains of Northwestern Nevada: US Geological Survey Open-File Report 2011-1182.
- Coates, P. S., M. L. Casazza, E. J. Blomberg, S. C. Gardner, S. P. Espinosa, J. L. Yee, L. Wiechman, et al. 2013. Evaluating greater sage-grouse seasonal space use relative to leks: implications for surface use designations in sagebrush ecosystems. *The Journal of Wildlife Management* 77(8): 1598-1609.
- Coates, P. S., M. L. Casazza, B. E. Brussee, M. A. Ricca, K. B. Gustafson, C. T. Sanchez-Chopitea Overton, E. Kroger, et al. 2014a. Spatially explicit modeling of greater sage-grouse (*Centrocercus urophasianus*) habitat in Nevada and northeastern California—A decision-support tool for management: US Geological Survey Open-File Report 2014-1163, 83 p., <http://dx.doi.org/10.3133/ofr2014-1163>.
- Coates, P. S., K. B. Howe, M. L. Casazza, and D. J. Delehanty. 2014b. Common raven occurrence in relation to energy transmission line corridors transiting human-altered sagebrush steppe. *Journal of Arid Environments* 111:68–78.
- Coates, P. S., and M. L. Casazza. In prep. . Avoidance by greater sage-grouse of pinyon pine and juniper tree encroachment within sagebrush ecosystem.
- Coates et al In prep.. Winter habitat selection of greater sage-grouse in the Bi-State DPS.
- Collins, E. I. 1984. Preliminary classification of Wyoming plant communities. Wyoming Natural Heritage Programs and The Nature Conservancy. Cheyenne, Wyoming.
- Comer, P. J., P. J. Crist, M. S. Reid, J. Hak, H. Hamilton, B. Unnasch, I. Varley, et al. 2012a. Central Basin and Range Rapid Ecoregional Assessment Report. Prepared for the US Department of the Interior, Bureau of Land Management.
- _____. 2012b. A Rapid Ecoregional Assessment of the Mojave Basin and Range Ecoregion. Report, appendices, and databases provided to the Bureau of Land Management.
- Comer, P., P. Crist, M. Reid, J. Hak, H. Hamilton, D. Braun, G. Kittel, et al. 2013. Central Basin and Range Rapid Ecoregional Assessment Report. Prepared for the US Department of the Interior, Bureau of Land Management.

- Condon, L., P. J. Wiesberg, and J. C. Chambers. 2011. Abiotic and biotic influences on *Bromus tectorum* invasion and *Artemisia tridentata* recovery after fire. *International Journal of Wildland Fire* 20:597-604.
- Congressional Research Service. 2012. Forest Service Payments to Counties—Title I of the Federal Forests County Revenue, Schools, and Jobs Act of 2012: Issues for Congress. R42452. Internet website: <http://www.nationalaglawcenter.org/assets/crs/R42452.pdf>.
- Connelly, J. W. 1982. An ecological study of sage grouse in southeastern Idaho. Washington State University, Pullman.
- Connelly, J. W., W. L. Wakkinen, A. D. Apa, and K. P. Reese. 1991. Sage grouse use of nest sites in southeastern Idaho. *Journal of Wildlife Management* 55:521–524.
- Connelly, J. W., and C. E. Braun. 1997. “A review of long-term changes in sage grouse populations in western North America.” *Wildlife Biology* 3:229-234.
- Connelly, J. W., and L. A. Doughty, eds. 1989. Sage grouse use of wildlife water developments in southeastern Idaho: Boise, Idaho.
- Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000a. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin* 28:967-985.
- Connelly, J. W., A. D. Apa, R. B. Smith, and K. P. Reese. 2000b. “Effects of predation and hunting on adult sage grouse *Centrocercus urophasianus* in Idaho.” *Wildlife Biology* 6:227-232.
- Connelly, J. W., K. P. Reese, and M. A. Schroeder. 2003. Monitoring of Greater Sage-Grouse Habitats and Populations. College of Natural Resources Experiment Station. University of Idaho. Moscow, Idaho, USA.
- Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished report. Cheyenne, Wyoming.
- Connelly, J., K. Reese, and M. Schroeder. 2010b. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Pygmy Rabbit as Endangered or Threatened. Washington, DC. *Federal Register* FWS-R8-ES-2007-0022. P. 60516.
- Connelly, J. W., E. T. Rinkes, and C. E. Braun. 2011. Characteristics of greater sage-grouse habitats: A landscape species at micro and macro scales. *Studies in Avian Biology*: 69-83.
- Cooper, S. V., P. Lesica, and G. M. Kudray. 2007. Post-fire Recovery of Wyoming Big Sagebrush Shrub-Steppe in Central And Southeast Montana. The Montana Natural Heritage Program, United States Bureau of Land Management, Montana State Office, Helena.

- Copeland, H. E., A. Pocewicz, D. E. Naugle, T. Griffiths, D. Keinath, J. Evans, J. Platt. 2013. Measuring the effectiveness of conservation: A novel framework to quantify the benefits of sage-grouse conservation policy and easements in Wyoming. *PLoS ONE* 8(6): e67261. DOI:10.1371/journal.pone.0067261. County of Elko. 2012. Elko County, Nevada Greater Sage Grouse Management and Conservation Strategy Plan. Division of Natural Resource Management. September 19, 2012. 179 pp.
- County of Lake. 2015. Solar. Internet website: http://www.lakecountyor.org/government/solar_projects/index.php. Accessed on April 15, 2015.
- Crawford, J. A., R. A. Olson, N. E. West, J. C. Mosley, M. A. Schroeder, T. D. Whitson, R. F. Miller et al. 2004. "Ecology and management of sage-grouse and sage-grouse habitat." *Journal of Range Management* 57:2-19.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal, and P. K. Holmgren. 1994. Intermountain flora. *Vascular Plants of the Intermountain West, USA* Vol. 5. Asterales. The New York Botanical Garden, Bronx, New York.
- Dalldorf, K. N., S. R. Swanson, D. F. Kozlowski, K. M. Schmidt, R. S. Shane, and G. Fernandez. 2013. Influence of Livestock Grazing Strategies on Riparian Response to Wildfire in Northern Nevada. *Rangeland Ecology & Management* 66:1, 34-42. January 1, 2013.
- D'Antonio, C. M. and P. M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecology and Systematics* 23:63-87.
- Danvir, R. E. 2002. Sage grouse ecology and management in northern Utah sagebrush-steppe. Deseret Land and Livestock Ranch and the Foundation for Quality Resource Management, Woodruff, Utah, USA.
- Davies, K. W., Jonathan D. Bates, and Richard F. Miller. 2006. Vegetation Characteristics Across Part of the Wyoming Big Sagebrush Alliance. *Rangeland Ecology & Management* Vol. 59, No. 6, pp. 567-575. November 2006.
- Davies, K. W., T. J. Svejcar, and J. D. Bates. 2009. Interaction of historical and nonhistorical disturbances maintains native plant communities. *Ecological Applications* 19(6):1536-1545.
- Davies, K. W., J. D. Bates, T. J. Svejcar, and C. S. Boyd. 2010. Effects of long-term livestock grazing on fuel characteristics in rangelands: An example from the sagebrush steppe. *Rangeland Ecology & Management* 63(6), 662-669. DOI:10.2111/REM-D-10-00006.1.
- Davies, K. W., C. S. Boyde, J. L. Beck, J. D. Bates, T. J. Svejcar, and J. G. Gregg. 2011. Saving the sagebrush sea: An ecosystem conservation plan for big sagebrush. *Biological Conservation* 144:2573-2584.
- D'Azevedo, Warren I. (editor). 1986. *Handbook of North American Indians*, Volume 11, Great Basin. Smithsonian Institution, Washington, DC.

- Delong, A. K., J. A. Crawford, and D. C. Delong, Jr. 1995. Relationships between vegetational structure and predation of artificial sage grouse nests. *Journal of Wildlife Management* 59:88-92.
- Deur, Douglas. 2010. Ruby Pipeline Ethnographic Study, Fort Bidwell Indian Community: Barrel Springs Traditional Cultural Property Report. BLM Winnemucca District Office, Nevada.
- Dickard, M., M. Gonzalez, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, et al. 2014. Forthcoming. Riparian area management: Proper functioning condition assessment for lotic areas. Second edition. Technical Reference 1737-15. US Department of the Interior, Bureau of Land Management, Denver, CO.
- Diamond, J. M., C. A. Call, and N. Devoe. 2009. Effects of targeted cattle grazing on fire behavior of cheatgrass-dominated rangeland in the northern Great Basin, USA. *International Journal of Wildland Fire* 18:944-950.
- Dickard, M., M. Gonzalez, W. Elmore, S. Leonard, D. Smith, S. Smith, J. Staats, et al. 2014. Riparian area management: Proper functioning condition assessment for lotic areas. Second edition. Technical Reference 1737-15. US Department of the Interior, Bureau of Land Management, Denver, CO.
- Dobkin, D. S., A. C. Rich, and W. H. Pyle. 1998. Habitat and avifaunal recovery from livestock grazing in a riparian meadow system of the northwestern Great Basin. *Conservation Biology* 12:209–221.
- Doherty, M. K. 2007. Mosquito populations in the Powder River Basin, Wyoming: A comparison of natural, agricultural, and effluent coal-bed natural gas aquatic habitats. Thesis. Montana State University, Bozeman.
- Doherty, K. E., D. E. Naugle, B. L. Walker, and J. M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. *Journal of Wildlife Management* 72:187-195.
- Doherty, K. E., J. L. Beck, and D. E. Naugle. 2011. Comparing Ecological Site Descriptions to Habitat Characteristics Influencing Greater Sage-Grouse Nest Site Occurrence and Success. *Rangeland Ecol Manage.* 64:344-351. July 2011.
- Doherty, K. E., D. E. Naugle, H. Copeland, A. Pocewicz, and J. Kiesecker. 2011. Energy development and conservation tradeoffs: systematic planning for greater sage-grouse in their eastern range. In: S. T. Knick and J. W. Connelly (editors), *Greater Sage-Grouse: Ecology of a Landscape Species and Its Habitats*. University of California Press, Cooper Ornithological Society, Berkeley. Pp. 505-516.
- DOE (US Department of Energy). 2011. Ormat Nevada Northern Nevada Geothermal Power Plant Projects. Environmental Assessment. DOE/EA-1849. US Dept. Energy Loan Guarantee Program Office, Washington, DC.
- DOI (US Department of the Interior). 2004. National Sage-Grouse Habitat Conservation Strategy. WO IM 2005-024. Washington, DC.
- _____. 2006. 620 DM 3: Interagency Burned Area Rehabilitation Guidebook. Version 1.3. October 2006.

- _____. 2008. Departmental Manual Part 522: Adaptive Management. February 1, 2008.
- _____. 2012. Payments in Lieu of Taxes. Internet website: <http://www.doi.gov/pilt/index.cfm>.
- DOI and USDA. 2013. Interagency Standards for Fire and Fire Aviation Operations. NFES 2724.
- DOI (US Department of the Interior), Forest Service (US Department of Agriculture, National Forest Service), DOE (US Department of Energy), US Department of Defense, US Department of Commerce, EPA (US Environmental Protection Agency), Federal Emergency Management Agency, and National Association of State Foresters. 2001. Review and Update of the 1995 Federal Wildland Fire Management Policy. January 2001.
- Douglas County. 2007. Open Space Plan. Minden, Nevada. July 1, 2007.
- _____. 2012. Comprehensive Master Plan. Minden, Nevada. March 2012.
- Drought Monitor Archives. 2015. Internet website: <http://droughtmonitor.unl.edu/archive.html>. Accessed on April 11, 2015.
- Duke University. 2012. Hydraulic fracturing likely did not create fissures, but gas from leaking well casings could exploit them. *Science Daily*. Internet website: <http://www.sciencedaily.com/releases/2012/07/120709155411.htm>.
- Duncan, P., T. Foote, I. Gordone, C. Gakahu, and M. Lloyd. 1990. Comparative Nutrient Extraction from Forages by Grazing Bovids and Equids: A Test of the Nutritional Model of Equid/Bovid Completion and Coexistence. *Oecologia*, 84:411-418.
- Dunn, P. O., and C. E. Braun. 1986. Late summer-spring movements of juvenile sage grouse. *Wilson Bulletin* 98:83-92.
- Dwire, K. A., J. B. Kauffman, E. N. Jack Brookshire, and J. E. Baham. 2004. Plant biomass and species composition along an environmental gradient in montane riparian meadows. *Oecologia* 139: 309-317.
- Dwire, K. A., J. B. Boone, and J. E. Baham. 2006. Plant species distribution in relation to water-table depth and soil redox potential in montane riparian meadows. *Wetlands* 26 (1): 131-146.
- Eberhardt, L. L., A. K. Majorowicz, and J. A. Wilcox. 1982. Apparent rates of increase for two feral horse herds. *Journal of Wildlife Management* 46 (2):367-374.
- Eddleman, L. E., and P. S. Doescher. 1999. Current issues in the sagebrush steppe ecosystem: grazing, fire and other disturbances. In: P. G. Entwistle, A. M. DeBolt, J. H. Kaltenecher, and K. Steenhof (compilers), Proceedings: Sagebrush Steppe Ecosystems Symposium. BLM Publ. No. BLM/ID/PT-001001=1150. Boise, Idaho. Pp. 21-23.
- Ehrhart, R. C., and P. L. Hansen. 1997. Effective Cattle Management in Riparian Zones: A Field Survey and Literature Review. Montana Bureau of Land Management Riparian Technical Bulletin 3. Montana Forest and Conservation Experiment Station, University of Montana, Missoula.

- EIA (Energy Information Administration). 2012. Power Outages Often Spur Questions Around Burying Power Lines. July. Available: <http://www.eia.gov/todayinenergy/detail.cfm?id=7250>.
- _____. 2013. Annual Energy Outlook with Projections to 2040. Internet website: [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf). Accessed on June 04, 2014.
- Eichhorn, L. C., and C. R. Watts. 1984. Plant succession of burns in the River Breaks of central Montana. *Proceedings of the Montana Academy of Sciences* 43:21-34.
- Eiswerth, M. E., and J. S. Shonkwiler. 2006. Examining post-wildfire reseeding on arid rangeland: a multivariate to bit modeling approach. *Ecological Modeling* 192:286-298.
- Elko County. 2003. Elko County, Nevada, General Open Space Plan. Elko, Nevada. September 2003.
- _____. 2007. Water Resource Management Plan. Elko, Nevada. September 2007.
- _____. 2008. Public Lands Policy Plan. Elko, Nevada.
- _____. 2010. Elko County Public Land Use and Natural Resources Management Plan. Elko, Nevada.
- _____. 2012. Elko County, Nevada Division of Natural Resource Management Greater Sage Grouse Management and Conservation Strategy Plan. Internet website: http://www.elkocountynv.net/meetings/board_of_commissioners/docs/Elko_County_Public_Land_Use__Natural_Resource_Management_Plan___Approved_Final.pdf.
- Ellingson, L., A. Seidl, and C. J. Mucklow. 2006. Tourists' Value of Routt County's Working Landscape, 2005: Summary Report. EDR 0-07, Economic Development Report, Dept. of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO. Internet website: <http://dare.colostate.edu/pubs/EDR/EDR06-07.pdf>.
- Ellis, K. L. 1984. Behavior of lekking sage-grouse in response to a perched golden eagle. *Western Birds* 15:37-38.
- _____. 1985. Effects of a new transmission line on the distribution and aerial predation of breeding male sage-grouse. Final report.
- Elmore, W., and B. Kauffman. 1994. Riparian and watershed systems: Degradation. In: M. Vavra, W. A. Laycock, and R. D. Pieper (editors), *Ecological Implications of Livestock Herbivory in the West*. Soc. for Range Management, Denver, Colorado.
- ENEL Green Power. 2013. Stillwater Solar Geothermal Hybrid Project. Internet website: http://www.enelgreenpower.com/en-GB/ena/power_plants/wm/Stillwater_Solar/index.aspx.
- Eng, R. L., and P. Schladweiler. 1972. Sage grouse winter movements and habitat use in central Montana. *Journal of Wildlife Management* 36: 141-146.
- EPA (United States Environmental Protection Agency). 1987. Memorandum: Nonpoint Source Controls and Water Quality Standards. Washington, DC.

- _____. 2002. Directional Drilling Technology. Prepared for EPA by Advanced Resources International. Washington, DC.
- _____. 2007. Level III Ecoregions of the Continental United States. Washington, DC.
- _____. 2010. Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States. Washington, DC. July 2010.
- _____. 2012. Emissions from the oil and natural gas industry. Last updated October 10, 2012. Internet website: <http://www.epa.gov/airquality/oilandgas/basic.html>. Accessed on February 1, 2013.
- Epanchin-Niell, R. S., M. B. Hufford, C. E. Aslan, J. P. Sexton, J. D. Port, and T. M. Waring. 2009. Controlling invasive species in complex social landscapes. *Front. Ecol. Environ.* DOI:10.1890/090029.
- Esmeralda County. 2011. Master Plan. Goldfield, Nevada. December 7, 2011.
- _____. 2013. Public Lands Policy Plan. Goldfield, Nevada.
- Eureka County. 2010. Master Plan. Eureka, Nevada. April 6, 2010. Internet website: http://www.co.eureka.nv.us/PDF/Master_Plan_Final_2010.pdf.
- Evangelista, P.H., A.W. Crall, and E. Bergquist. 2011. Invasive plants and their response to energy development. In: D. E. Naugle, editor. Energy development and wildlife conservation in western North America. Island Press, Washington, DC. Pp. 115-129.
- Evans, C. C. 1986. The relationship of cattle grazing to sage grouse use of meadow habitat on the Sheldon National Wildlife Refuge. Master's Thesis. University of Nevada, Reno.
- Everett, Jeff. Wildlife Biologist, USFWS Oregon Fish and Wildlife Office, Portland, Oregon. Phone conversation with author. April 16, 2015.
- Everett, Jeff. Wildlife Biologist, USFWS Oregon Fish and Wildlife Office, Portland, Oregon. Email with author. April 16, 2015.
- Everitt B. S. and G. Dunn. 1991. Applied Multivariate Data Analysis. Edward Arnold. London. pp. 219-220.
- Fedy, B. C., and C. L. Aldridge. 2011. The importance of within-year repeated counts and the influence of scale on long-term monitoring of sage-grouse. *Journal of Wildlife Management* 75:1022–1033.
- Feist, J. 1971. Behavior of Feral Horses in the Pryor Mountain Wild Horse Range. Ann Arbor, MI. Master's Thesis. University of Michigan.

- Ffolliott, P. F., and C. Stropki. 2008. Impacts of pinyon-juniper treatments on water yields: a historical perspective. In: G. J. Gottfried, J. D. Shaw, and P. L. Ford, comps. Ecology, management, restoration of piñon-juniper and ponderosa pine ecosystems: combined proceedings of the 2005 St. George, Utah and 2006 Albuquerque, New Mexico workshops. Proceedings RMRS-P-51. Fort Collins: CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pp. 59-64.
- FICMNEW (Federal Interagency Committee for the Management of Noxious and Exotic Weeds). 2003. A National Early Detection and Rapid Response System for Invasive Plants of the United States. Washington, DC. September 2003.
- Fiero, Bill. 1986. Geology of the Great Basin. University of Nevada Press, Reno, NV.
- Finch, W. I. 1996. Uranium provinces of North America—Their definition, distribution and models: Department of Energy.
- Finney, M. A., C. W. McHugh, and I. Grenfell. 2010. Continental-scale simulation of burn probabilities, flame lengths, and fire size distributions for the United States. In: D. X. Viegas, ed. Fourth international conference on forest fire research; Coimbra, Portugal; 13-18 November 2010. Associacao para o Desenvolvimento da Aerodinamica Industrial.
- Fire and Invasive Assessment Team. 2014. Greater Sage-Grouse Wildfire, Invasive Annual Grasses and Conifer Expansion Assessment (Fire and Invasives Assessment Tool [FIAT]). June 2014.
- Fischer, A., W. L. Wakkinenk, P. Reese, and J. W. Connelly. 1996. Effects of prescribed fire on movements of female sage grouse from breeding to summer ranges. *Wilson Bulletin* 109:82-91.
- Fitch, L., and N. Ambrose. 2003. *Riparian Areas: A User's Guide to Health*. Lethbridge, Alberta: Cows and Fish Program. ISBN No. 0-7785-2305-5.
- Fleishman, E., J. Thomson, B. G. Dickson, D. S. Dobkin, and M. Leu. 2012. Current and Projected future Connectivity of Habitat for Breeding Birds in Central Nevada. Nevada Department of Wildlife, Reno.
- Forest Service (United States Department of Agriculture, Forest Service). 1986a. Humboldt National Forest Land and Resource Management Plan. Humboldt National Forest. Sparks, NV. August 1986.
- _____. 1986b. Toiyabe National Forest Land and Resource Management Plan. Toiyabe National Forest. Sparks, NV. August 1986.
- _____. 1990. Manual 1500, External Relations. June 1, 1990.
- _____. 2000. Protecting People and Sustaining Resources in Fire Adapted Ecosystems: A Cohesive Strategy. US Department of Agriculture, US Forest Service, Washington, DC. October 13, 2000.
- _____. 2004a. National Strategy and Implementation Plan for Invasive Species Management. All US Government Documents (Utah Regional Depository). Paper 538.

-
- _____. 2004b. Handbook 1509.13-3—American Indian and Alaska Native Relations Handbook. March 3, 2004.
- _____. 2005. Travel Management; Designated Routes and Areas for Motor Vehicle Use; Final Rule. 70 *Federal Register* 68264. November 9, 2005.
- _____. 2006a. Manual 1920—Land Management Planning. 1900-2006-2. Washington, DC.
- _____. 2006b. Handbook 1909.12—Land Management Planning. 1909.12-2006-9. Washington, DC.
- _____. 2007a. Santa Rosa Ranger District Travel Management Plan. Humboldt-Toiyabe National Forest.
- _____. 2007b. White Pine and Grant-Quinn Oil and Gas Leasing Project. Humboldt-Toiyabe National Forest.
- _____. 2009a. Record of Decision: USDA Forest Service Designation of Section 368 Energy Corridors on National Forest System Land in 10 Western States. Washington Office, Washington DC. January 15, 2009.
- _____. 2009b. Austin and Tonopah Ranger Districts Combined Travel Management Project. Humboldt-Toiyabe National Forest. Tonopah, NV.
- _____. 2009c. Ely Ranger District Travel Management Project. Humboldt-Toiyabe National Forest. Ely, NV.
- _____. 2009d. Guidance for Implementation of Federal Wildland Fire Management Policy.
- _____. 2009e. Manual 7700—Travel Management. January 8, 2009.
- _____. 2009f. Handbook 7709.55—Travel Planning. January 8, 2009.
- _____. 2010. Elkhorn Vegetation Treatment Project. Humboldt-Toiyabe National Forest.
- _____. 2011a. Aurora Area Geothermal Leasing Project. Humboldt-Toiyabe National Forest.
- _____. 2011b. McGinness Hills Geothermal Power Plan Project. Humboldt-Toiyabe National Forest.
- _____. 2011c. Intermountain Region (R4) Threatened, Endangered, Proposed, and Sensitive Species. July 27, 2011, update.
- _____. 2011d. Nationwide Aerial Application of Fire Retardant on National Forest System Lands. Record of Decision. United States Department of Agriculture.
- _____. 2012a. Forest Service Handbook 1909.15—NEPA Handbook.
- _____. 2012b. Environmental Impact Statement for Geothermal Leasing on the Humboldt-Toiyabe National Forest. Humboldt-Toiyabe National Forest. September 18, 2012.

-
- _____. 2012c. Mountain City, Ruby Mountains, and Jarbidge Districts Combined Travel Management Project. Humboldt-Toiyabe National Forest.
- _____. 2012d. North Schell Restoration Project. Humboldt-Toiyabe National Forest.
- _____. 2012e. Pacific Crest National Scenic Trail. Internet website: <http://www.fs.usda.gov/pct>. Accessed on November 26, 2012.
- _____. 2012f. National Visitor Use Monitoring, Round 2 Results.
- _____. 2012g. Personal communication. Chris Miller, to Rob Fetter, ICF International. August 2012.
- _____. 2013a. Humboldt-Toiyabe National Forest Fire Management Plan.
- _____. 2013b. FACTS activity database. Forest Service fuels related treatments on Forest Service-administered lands within the planning area. Accessed on May 7, 2013.
- _____. 2013c. Natural Resource Management Forest Service WEB, Special Use Database System.
- _____. 2013d. Recreation and Tribal Grazing. Personal communication. Chris Miller. June 2013.
- _____. 2013e. Secure Rural Schools. Payment and Receipts. Payment Report ASR 10-I FY2012. Internet website: <http://www.fs.usda.gov/main/pts/securepayments/projectedpayments>.
- _____. 2013f. Expenditures on National Forests. Personal communication. Susan Winter, to Alex Uriarte, April 2013.
- _____. 2013g. Human Resources Management, Human Resources Reporting Center. Active Position Organizational Listing worksheets, by region. Internet website: http://fsweb.asc.fs.fed.us/HRM/reports/gen_reports.php.
- _____. 2013h. National Visitor Use Monitoring, Round 2 Results. USDA Forest Service Natural Resource Manager. Visits by Market Segment, Activity Participation, Regional Annual Visit Duration, and Annual Visitation Estimate for Humboldt-Toiyabe National Forest, FY 2006. US Department of Agriculture, Washington, DC. Internet website: <http://www.fs.fed.us/recreation/programs/nvum/>.
- Forests and Rangelands. 2006. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan. December 2006.
- Forman, R. T. T., and L. E. Alexander. 1998. Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29:207.
- Fowler, Catherine. 1986. Subsistence. In: W. D'Azevedo (editor), *Handbook of North American Indians, Volume 11: Great Basin*. Smithsonian Institution, Washington, DC. Pp. 43-97.

- _____. 2002. In the Shadow of Fox Peak: An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh. Second Edition. Reno: Nevada Humanities Committee.
- Freeman, M. 2003. The Measurement of Environmental and Resource Values. Resources for the Future Press, Washington, DC.
- Ganskopp, D., and Vavra, M. 1986. Habitat Use by Feral Horses in the Northeastern Sagebrush Steppe. *Journal of Range Management* 39:207-212.
- Garate, Donald T. 1975. *Red Rock to Ravendale: Memories of a Northern California Community*. Lassen County Historical Society, Susanville, California.
- Garrott, R. A., and L. Taylor. 1990. Dynamics of a feral horse population in Montana. *Journal of Wildlife Management* 54 (4):603-612.
- Garrott, R. A., D. B. Siniff, and L. L. Eberhardt. 1991. Growth rates of feral horse populations. *Journal of Wildlife Management* 55(4):641-648.
- Garton, E. O., J. W. Connelly, J. S. Horne, C. A. Hagen, A. Moser, and M. Schroeder. 2011. Greater sage-grouse population dynamics and probability of persistence. In: S. T. Knick and J. W. Connelly (editors), *Greater Sage-Grouse: Ecology of a Landscape Species and Its Habitats*. Cooper Ornithological Union, University of California Press, Berkeley. Pp. 293-381.
- Garton, E. O., A. G. Wells, J. A. Baumgardt and J. W. Connelly. 2015. Greater Sage-Grouse Population Dynamics and Probability of Persistence. Final Report to Pew Charitable Trusts. 18 March.
- GBBO (Great Basin Bird Observatory). 2010. Nevada Comprehensive Bird Conservation Plan, ver. 1.0. Great Basin Bird Observatory, Reno, Nevada. Internet website: www.gbbo.or/bird_conservation_plan.html. Accessed on May 2013.
- _____. 2012. Bird Population Responses to Projected Effects of Climate Change in Nevada: An Analysis for the 2012 Revision of the Nevada Wildlife Action Plan. Prepared for Nevada Department of Wildlife, Reno, Nevada. Final Report. February 27, 2012.
- Gelbard, J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. *Conservation Biology* 17:420-432.
- George, M. R., R. D. Jackson, C. S. Boyd, K. W. Tate. 2011. A scientific assessment of the effectiveness of riparian management practices. In: D. D. Briske (ed.), *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps*. Washington, DC: USDA-NRCS. Pp. 213-252.
- Geothermal Energy Association. 2010. Geothermal power booming in Nevada: GEA expects 30-year economic output of \$22.5 billion. Internet website: http://www.nye-renewables.com/docs/2010_GEA_NV_Geothermal_Boom.pdf.

- Gerber, P. J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Falcucci, and G. Tempio. 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Food and Agriculture Organization of the United Nations (FAO), Rome.
- Germino, M. J. 2012. Hydro-climate effects on rangeland ecosystems soils in the Great Basin: thresholds and transformations. *Great Basin Climate Change Forum*. Desert Resea.
- Gibson, R. M., and J. W. Bradbury. 1986. Male and Female Mating Strategies on Sage Grouse Leks. In: *Ecological Aspects of Social Evolution: Birds and Mammals*, D. I. Rubenstein and R. W. Wrangham (editors). Princeton University Press, Princeton, New Jersey. Pp. 379-398.
- Gibson, D., E. Blomberg, J. Sedinger. 2013. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Final. University of Nevada, Reno. December 2013.
- Giesen, K. M. 1995. Upland bird research: evaluation of livestock grazing and residual herbaceous cover on sage grouse nest success. Job final report, project number COW-167-R/Job 18/Wk.Pl. 3. Colorado Division of Wildlife, Colorado.
- Gillen, R. L., W. C. Krueger, and R. F. Miller. 1984. Cattle distribution on mountain rangeland in northeastern Oregon. *Journal of Range Management* 37:549-553.
- Gilmore, Harry W. 1953. Hunting habits of the early Nevada Paiutes. *American Anthropologist*, 55, No. 1:148-153.
- Graham, L., and B. Jones. 2005. Northern Eagle/Southern Routt Greater Sage-Grouse Summary Report. Colorado Division of Wildlife, Steamboat Springs, Colorado.
- Gratson, M. W. 1993. Sexual selection for increased male courtship and acoustic signals and against large male size at sharp-tailed grouse leks. *Evolution* 47:691-696.
- Grayson, Donald K. 1977. A Review Of The Evidence For Early Holocene turkeys in the Northern Great Basin. *American Antiquity* 42:110-114.
- _____. 1979. Mount Mazama, Climatic Change, and Fort Rock Basin Archaeofaunas. In: *Volcanic Activity and Human Ecology*, Payson D. Sheets and Donald K. Grayson (editors). Academic Press, New York, New York. Pp. 427-457.
- _____. 1993. *The Desert's Past: A Natural History of the Great Basin*. Smithsonian Institution, Washington, DC.
- Grayson, Donald K., and Paul W. Parmalee. 1988. Hanging Rock Shelter. In: *Danger Cave, Last Supper Cave, and Hanging Rock Shelter: The Faunas*, Donald K. Grayson (editor), Anthropological Papers 66 (Part 1). American Museum of Natural History, New York, New York. Pp. 105-115.
- Greater Sage-Grouse Habitat Conservation Advisory Council. 2014. Montana's Greater Sage-Grouse Habitat Conservation Strategy.

- Green, B. H., and H. D. Smith. 1981. Habitat utilization by sage sparrows in mixed desert shrub community. Abstract. *Encyclia* 58:159.
- Green, J. S., and J. T. Flinders. 1980. *Brachylagus idahoensis*. Mammal. *Species*, No. 125. Greenleaf Power. 2013. Honey Lake. Internet website: <http://www.greenleaf-power.com/facilities/honey-lake.html>.
- Green, D. M. and J. B. Kauffman. 1995. Succession and livestock grazing in a northeastern Oregon riparian ecosystem. *J. Range Manage.* 48:307-313.
- Gregg, M. A. 1991. Use and selection of nesting habitat by sage grouse in Oregon. Master's thesis. Oregon State University, Corvallis.
- Gregg, M. A., J. A. Crawford, M. S. Drut, and A. K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. *Journal of Wildlife Management* 58:162-166.
- Gregg, M. A., J. K. Barnett, and J. A. Crawford. 2008. Temporal variation in diet and nutrition of preincubating Greater Sage-Grouse. *Rangeland Ecol. Mgt.* 61(5):535-542.
- Griffiths, C., H. Klemick, M. Massey, C. Moore, S. Newbold, D. Simpson, P. Walsh, and W. Wheeler. 2012. US Environmental Protection Agency Valuation of Surface Water Quality Improvements. *Environmental Economics and Policy* 6(1): 130-146.
- Hagen, C. A., J. W. Connelly, and M. A. Schroeder. 2007. "A meta-analysis for greater sage-grouse nesting and brood rearing habitats." *Wildlife Biology* 13 (Supplement 1):42-50.
- Hagen, C. 2011. Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat. Oregon Department of Fish and Wildlife, Bend, OR. April 22, 2011. 207 pp.
- Hagen, C. A. 2011. Predation on sage-grouse: facts, effects, and process. Pp. 95-100 in S. T. Knick and J. W. Connelly. Greater Sage-Grouse: ecology and conservation of a landscape species and its habitat. *Studies in Avian Biology* 38. University of California Press, Berkeley, CA.
- Hall, F. C., and L. Bryant. 1995. Herbaceous stubble height as a warning of impending cattle grazing damage to riparian areas: Portland, Oreg., USDA Forest Service, Pacific Northwest Research Station, PNW-GTR-362.
- Hanf, J. M., P. A. Schmidt, and E. B. Groshens. 1994. Sage grouse in the high desert of central Oregon: results of a study, 1988-1993. United States Department of the Interior, Bureau of Land Management, Series P-SG-01, Prineville, Oregon.
- Hanes, Richard C. 1982. Cultural persistence in Nevada: Current Native American issues. *Journal of Great Basin and California Anthropology*, Vol. 4, No. 2:203-221.
- _____. 1995. Treaties, Spirituality, and Ecosystems, American Indian Interests in the Northern Intermontane Region of Western North America. All US Government Documents (Utah Regional Depository). Paper 234. Internet website: <http://digitalcommons.usu.edu/govdocs/234>.

- Hanley, T. A. and K. A. Hanley. 1982. Food resource partitioning by sympatric ungulates on Great Basin rangeland. *Journal of Range Management* 35:152–158.
- Hann, W. J., and D. L. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. *International Journal of Wildland Fire* 10:389-403.
- Hann, Wendel J., Ayn Shlisky, Doug Havlina, Kathy Schon, Stephen W. Barrett, Thomas E. DeMeo, Kelly Pohl, et al. 2008. Interagency Fire Regime Condition Class (FRCC) Guidebook. Version 1.3.0. Homepage of the Interagency and The Nature Conservancy Fire Regime Condition Class website, USDA Forest Service, US Department of the Interior, The Nature Conservancy, and Systems for Environmental Management. Internet website: www.frcc.gov.
- Hanus, A. 2011. Socio-Economic Profile and Analysis of Seven Oregon Counties Included in the Greater Sage-Grouse Conservation Strategy for Oregon. Association of Oregon Counties.
- Harju, S. M., M. R. Dzialak, R. C. Taylor, L. D. Hayden-Wing, and J. B. Winstead. 2010. Thresholds and time lags in effects of energy development on greater sage-grouse populations. *Journal of Wildlife Management* 74:437–448.
- Harris, T., J. Alevy, and E. Fadali. 2007. Analysis of Impacts of Public Land Grazing on the Elko County Economy, Jarbidge and Mountain City Management Area: Part VII: Economic Impacts of Federal Grazing in Elko County. Technical Report UCED 2006/07-11, University of Nevada – Reno.
- Harrison, C. 1978. *A Field Guide to Nests, Eggs and Nestlings of North American Birds*. The Stephen Green Press, Brattleboro, Vermont.
- Headwaters Economics. 2012. Economic Profile System-Human Dimensions Toolkit (EPS-HDT). Internet website: <http://headwaterseconomics.org/tools/eps-hdt>.
- Heizer, Robert F. (editor). 1978. *Handbook of North American Indians*, Volume 8, California. Smithsonian Institution, Washington, DC.
- Hironaka, M., M. A. Fosberg, and A. H. Winward. 1983. Sagebrushgrass habitat types of southern Idaho. *Idaho Forest, Wildlife and Range Experiment Station, Bulletin* 35, Moscow, Idaho.
- Hockett, Bryan. 2007. Nutritional Ecology of Late Pleistocene to Middle Holocene Subsistence in the Great Basin: Zooarchaeological Evidence from Bonneville Estates Rockshelter. In: Kelly Graf and Dave Schmitt (editors), *Paleoindian*. University of Utah Press, Salt Lake City. Pp. 204-230.
- Hockett, Bryan, and Eric Dillingham. 2004. *Paleontological Investigations at Mineral Hill Cave*. Technical Report 18. Bureau of Land Management, Reno, Nevada.
- Hockett, Bryan, and Dennis Jenkins. 2013. Identifying stone tool cut marks and the Pre-Clovis occupation of the Paisley Caves. *American Antiquity* 78:762-778.
- Hockett, G. A. 2002. Livestock Impacts on the Herbaceous Components of Sage Grouse Habitat: A Review. *Intermountain Journal of Sciences*. 8(2) 105-114.

- Holechek, J. L. 1988. An approach for setting the stocking rate. *Rangelands* 10(1).
- Holechek, J. L., R. D. Piper, and C. H. Herbel. 1998. *Range Management: Principles and Practices*. Third edition. Prentice-Hall, Upper Saddle River, New Jersey.
- Holloran, M. J. R. 2005. *Greater Sage-Grouse (Centrocercus urophasianus) Population Response to Natural Gas Field Development in Western Wyoming*. University of Wyoming, Laramie.
- Holloran, M. J. R., and S. H. Anderson. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sagebrush habitat. *Condor* 107:742-52.
- Holloran, M. J. R., R. C. Kaiser, and W. Hubert. 2010. Yearling greater sage-grouse response to energy development in Wyoming. *Journal of Wildlife Management* 74:65-72.
- Homer, C. G., T. C. Edwards, Jr., R. D. Ramsey, and K. P. Price. 1993. Use of remote sensing methods in modeling sage grouse winter habitat. *Journal of Wildlife Management* 57:78-84.
- Homer, C. G., G. Xian, C. L. Aldridge, D. K. Meyer, T. R. Loveland, and M. S. O'Donnell. 2015. Forecasting sagebrush ecosystem components and greater sage-grouse habitat for 2050: Learning from past climate patterns and Landsat imagery to predict the future. *Ecological Indicators* 55:131-145.
- Hood, Sharon M., and Melanie Miller. 2007. Fire ecology and management of the major ecosystems of Southern Utah. Gen. Tech. Rep. RMRS-GTR-202. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 110 p.
- Hopper, Bob. BLM Oregon/Washington Office. Phone conversation with author, April 13, 2015.
- Hough-Snee, N., B. B. Roper, J. M. Wheaton, P. Budy, and R. L. Lokteff. 2013. Riparian vegetation communities change rapidly following passive restoration at a northern Utah stream. *Ecological Engineering* 58: 371-377.
- Howard, H. 1952. The prehistoric avifauna of Smith Creek Cave, Nevada, with a description of a new gigantic raptor. *Southern California Academy of Sciences Bulletin* 51(Part 2):50-54.
- Howe, K. B., P. S. Coates, and D. J. Delehanty. 2014. Selection of anthropogenic features and vegetation characteristics by nesting Common Ravens in the sagebrush ecosystem. *The Condor* 116(1):35-49.
- Howell, Cheri. 2014. US Forest Service Ecologist, Humboldt Toiyabe National Forest. Personal communication, May 14, 2014.
- Hulbert, L. C. 1955. Ecological studies of *Bromus tectorum* and other annual brome grasses. *Ecological Monographs*. 25:181-213.
- Hull, S. D., R. J. Robel, and K. E. Kemp. 1996. Summer avian abundance, invertebrate biomass, and forbs in Kansas CRP: *Prairie Naturalist*, v. 28, p. 1-12.

- Hultkrantz, Åke. 1986. Mythology and Religious Concepts. In: W. D'Azevedo (editor), *Handbook of North American Indians, Volume 11: Great Basin*. Smithsonian Institution, Washington, DC. Pp. 630-640.
- Humboldt County. 2002. Humboldt County Master Plan. Nevada.
- _____. 2003. Humboldt County Master Plan Open Space Element Amendment. Nevada.
- Hupp, J. W., and C. E. Braun. 1989. Topographic distribution of sage grouse foraging in winter. *Journal of Wildlife Management* 53:823-829.
- IDL (Idaho Department of Lands). 2015. Idaho Department of Lands Proposed Greater Sage-Grouse Conservation Plan. February 11, 2015.
- Idaho Sage-grouse Advisory Committee. 2006. Conservation Plan for the Greater Sage-grouse in Idaho.
- IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core writing team: R. K. Pachauri and A. Reisinger [editors]). IPCC, Geneva, Switzerland.
- Jackson, S. D. 2000. Overview of Transportation Impacts on Wildlife Movement and Populations. In: T. A. Messmer and B. West (editors) *Wildlife and Highways: Seeking Solutions to an Ecological and Socio-economic Dilemma*. *The Wildlife Society*: 7-20.
- James, S. R. 2004. Mineral Hill Cave Avifauna. In: B. Hockett and E. Dillingham (editors), *Paleontological Investigations at Mineral Hill Cave*. Technical Report No. 18, Bureau of Land Management, Reno, Nevada. Pp. 136-142.
- Jamison, B. E., R. J. Robel, J. S. Pontius, and R. D. Applegate. 2002. Invertebrate biomass: associations with lesser prairie-chicken habitat use and sand sagebrush density in southwestern Kansas: *Wildlife Society Bulletin*, v. 30, p. 517–526.
- Janson, R. G. 1946. A survey of the rabbits of Utah with reference to their classification, distribution, life histories and ecology. Master's thesis. Utah State University, Logan.
- Michael Jennings, D. Faber-Langendoen, R. Peet, O. Loucks, D. Glenn-Lewin, A. Damman, M. Barbour, et al. 2004. Guidelines for describing associations and alliances of the US national vegetation classification. *The Ecological Society of America Vegetation Classification Panel Version 4.0*.
- Jenkins, Dennis, L. Davis, T. W. Stafford, P. Campos, B. Hockett, G. Cummings Jones, et al. 2012. Clovis Age western stemmed projectile points and human coprolites at the Paisley Caves. *Science* 337:223-228.
- Jennings, Jesse D. 1957. Danger Cave. *Memoirs of the Society for American Archaeology* 14. Society for American Archaeology, Washington, DC.
- Jensen, H. P., D. Rollins, and R. L. Gillen. 1990. Effects of cattle stock density on trampling loss of simulated ground nests. *Wild. Soc. Bull.* 18: 71-74.

- Johnsgard, P. A. 1983. *Grouse of the World*. University of Nebraska Press, Lincoln.
- _____. 2002. *Grassland Grouse and Their Conservation*. Smithsonian Institution Press, Washington, DC and London.
- Johnson, D. H., M. J. Holloran, J. W. Connelly, S. E. Hanser, C. L. Amundson, and S. T. Knick. 2011. Influences of environmental and anthropogenic features on greater sage-grouse populations. In: S. T. Knick and J. W. Connelly (editors), *Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology* 38. University of California Press, Berkeley. Pp. 407-450.
- Johnson, G. D., and M. S. Boyce. 1991. Survival, growth, and reproduction of captive-reared sage grouse. *Wildlife Society Bulletin* 19:88-93.
- Johnson, G. D., and S. E. Stephens. 2011. Wind power and biofuels: a green dilemma for wildlife conservation. In: D. E. Naugle (editor), *Energy Development and Wildlife Conservation in Western North America*. Pp. 131-156.
- Jones, A. L. (editor). 2012. *Best Management Practices for Siting, Developing, Operating and Monitoring Renewable Energy in the Intermountain West: A Conservationists Guide*. Special publication. Wild Utah Project. Salt Lake City, Utah.
- Kaiser, R. C. 2006. Recruitment by greater sage-grouse in association with natural gas development in western Wyoming. Master's thesis. University of Wyoming, Laramie.
- Karl, T. R., J. M. Melillo, and T. C. Peterson. 2009. *Global climate change impacts in the United States*. National Science and Technology Council, Cambridge University Press.
- Kartesz, J. T. 1994. *A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland*. 2nd ed. 2 vols. Timber Press, Portland, Oregon.
- Kelly, Isabel. 1932. Ethnography of the Surprise Valley Paiutes. *American Archaeology and Ethnology*, Vol. 31, No. 3:67-210.
- _____. 1938. Northern Paiute tales. *The Journal of American Folklore* Vol. 51, No. 202:363-438.
- Kemphorne, Dirk. 2009. Climate Change and the Department of the Interior. Amendment No.1, Secretarial Order 3226. January 16, 2009.
- Kéry, M. and M. Schaub. 2011. *Bayesian population analysis using WinBUGS: a hierarchical perspective*. Academic Press, Burlington, VT. 560pp.
- Kirol, C. P., J. L. Beck, J. B. Dinkins, and M. R. Conover. 2012. Greater sage-grouse nesting and brood-rearing microhabitat selection in xeric big sagebrush. *Condor* 114:75-89.
- Klebenow, D. A. 1969. Sage grouse nesting and brood habitat in Idaho. *Journal of Wildlife Management* 33:649-662.

- _____. 1982. Livestock grazing interactions with sage grouse. P. 113-123 In Peek, J. M., and P. D. Dalke, Eds. 1982. Wildlife-Livestock Relations Symposium: Proceedings 10. Univ. of Idaho, Forest, Wildlife, and Range Experiment Station, Moscow, Idaho.
- Klebenow, D. A., and G. M. Gray. 1968. Food habits of juvenile sage grouse. *Journal of Range Management* 21:80-83.
- Knapp, P. A. 1996. Cheatgrass (*Bromus tectorum* L.) dominance in the Great Basin Desert. *Global Environmental Change* 6(1):37-52.
- Knapp, P. A., P. T. Soulé, H. D. Grissino-Mayer. 2001. Detecting potential regional effects of increased atmospheric CO₂ on growth rates of western juniper. *Global Change Biology* 7: 903-917.
- Knight, R. L., H. A. L. Knight, and R. J. Camp. 1995. Common ravens and number and type of linear rights-of-way. *Biological Conservation* 74:6-67.
- Knick, S. T. 2011. Historical development, principal federal legislation and current management of sagebrush habitats: implications for conservation. In: S. T. Knick and J. W. Connelly (editors), Greater sage-grouse: Ecology and conservation of a landscape species and its habitats. *Studies in Avian Biology* 38:13-32. University of California Press, Berkeley.
- Knick, S. T., and S. E. Hanser. 2011. "Connecting pattern and processing greater sage-grouse populations and sagebrush landscapes." In: S. T. Knick and J. W. Connelly (editors), "Greater sage-grouse: Ecology and conservation of a landscape species and its habitats." *Studies in Avian Biology* 38:383-405. University of California Press, Berkeley.
- Knick, S. T., and J. W. Connelly. 2011. Greater sage-grouse and sagebrush—Introduction to the landscape. In: S. T. Knick and J. W. Connelly (editors), Greater sage-grouse: Ecology and conservation of a landscape species and its habitats. Cooper Ornithological Society, University of California Press, Berkeley. Pp. 1-9.
- Knick, S. T., S. E. Hanser, R. F. Miller, D. A. Pyke, M. J. Wisdom, et al. 2011. Ecological influence and pathways of land use in sagebrush. In: S. T. Knick and J. W. Connelly (editors), Greater sage-grouse: Ecology and conservation of a landscape species and its habitats.
- Kolada, E. J., J. S. Sedinger, M. L. Casazza. 2009a. Nest site selection by greater sage-grouse in Mono County, California. *Journal of Wildlife Management* 73:1333-1340.
- _____. 2009b. Ecological factors influencing nest survival of greater sage-grouse in Mono County, California. *Journal of Wildlife Management* 73:1341-1347.
- Kotchen, M., and S. Reiling. 2000. Environmental attitudes, motivations, and contingent valuation of nonuse values: a case study involving endangered species. *Ecological Economics* 32:93-107.
- Kramer, A. T., and K. Havens. 2009. Plant conservation genetics in a changing world. *Trends in Plant Science* 14:599-607.

- Kucera, T. E. 1992. Influences of sex and weather on migration of mule deer in California. *Great Basin Naturalist* 52:122-130.
- Krutilla, J. V. 1967. Conservation Reconsidered. *American Economic Review* 57: 777-786.
- Lammers, W. M, and M. W. Collopy. 2007. Effectiveness of avian predator perch deterrents on electric transmission lines. *Journal of Wildlife Management* 71:2752-2758.
- Lander County. 2005. Lander County 2005 Policy Plan for Federally Administered Lands. Prepared by: The Lander County Public Land Use Advisory Planning Commission. July 25, 2005.
- _____. 2010. Master Plan. Battle Mountain, Nevada. October 28, 2010. Internet website: http://landercountynv.org/images/stories/general_files/Planning_and_Zoning/LanderMasterPlanfinalall.pdf.
- _____. 2011. Water Resources Plan. Battle Mountain, Nevada. March 24, 2011.
- Larrucea, E. S., and P. F. Brussard. 2008. Habitat selection and current distribution of the pygmy rabbit in Nevada and California, USA. *Journal of Mammalogy* 89:691-699.
- Lassen County. 1999. General Plan. September 21, 1999. Internet website: http://www.co.lassen.ca.us/govt/dept/planning_building/planning_division/general_area_plans.asp.
- _____. 2012. Lassen County Fire Safe Plan.
- Launchbaugh, K., B. Brammer, M. L. Brooks, S. Bunting, P. Clark, J. Davison, M. Fleming, et al. 2007. Interactions Among Livestock Grazing, Vegetation Type, and Fire Behavior in the Murphy Wildland Fire Complex in Idaho and Nevada. US Geological Survey Open-File Report 2008–1214. July 2007.
- Lavin, M., T. J. Brummer, R. Quire, B. D. Maxwell, and L. J. Rew. 2013. Physical disturbance shapes vascular plant diversity more profoundly than fire in the sagebrush steppe of southeastern Idaho, USA. *Ecology and Evolution* 3 (6): 1626-1641.
- Laycock, W. A. 1978. Factors affecting choice of management strategies within the sagebrush ecosystem United States, *Artemisia tridentata*, In: The sagebrush ecosystem: a symposium: Logan, Utah State University, College of Natural Resources, p. 230–236.
- Leaming, George F. 2010. The Impact of Federal Land Policies on the Economy of Elko County, Nevada.
- LeBeau, C. W. 2012. Evaluation of Greater sage-grouse reproductive habitat and response to wind energy development in south-central Wyoming. Master's thesis. University of Wyoming, Laramie.
- Leonard, K. A., K. P. Reese, and J. W. Connelly. 2000. Distribution, movements and habitats of sage grouse *Centrocercus urophasianus* on the Upper Snake River Plain of Idaho: Changes from the 1950s to the 1990s. *Wildlife Biology* 6:265-270.

- Leonard, S., G. Kinch, V. Elsbernd, M. Borman and S. Swanson. 1997. Riparian area management, grazing management for riparian-wetland areas. Technical Reference 1737-14, US Department of the Interior, Bureau of Land Management, National Applied Sciences Center, Denver, CO.
- Levy, Jonathan, Elizabeth Fadali, and Thomas Harris. 2007. Analysis of Impacts of Public Land Grazing on the Elko County Economy: Part III: Economic Impacts of Federal Grazing in Elko County. Technical Report UCED 2006/7-03. University of Nevada, Reno.
- Leu, M., S. E. Hanser, and S. T. Knick. 2008. The human footprint in the West: A large-scale analysis of anthropogenic impacts. *Ecological Applications* 18:1119-1139.
- Lincoln County (Nevada). 2007. Master Plan. September 4, 2007. Internet website: http://www.lincolncountynv.org/planning/Master_Plan_09-07.pdf.
- _____. 2010. Public Lands Policy Plan.
- _____. 2011. Open Space and Community Lands Plan. September 2011.
- List, J., and C. Gallet. 2001. What experimental protocol influences disparities between actual and hypothetical stated values? *Environmental and Resource Economics* 20: 241–254.
- Little, E. E., and R. D. Calfee. 2003. Effects of Fire-Retardant Chemical Products on Fathead Minnows in Experimental Streams. US Geological Survey, Columbia Environmental Research Center, Final report to the USDA Forest Service, Wildland Fire Chemical Systems (91260).
- Lockyer, Z. B. 2012. Greater Sage-Grouse Nest Predators, Nest Survival, and Nesting Habitat at Multiple Scales. Final Thesis, Idaho State University. August 2012.
- Lockyer, Z. B., P. S. Coates, M. L. Casazza, S. Espinosa, D. L. Delehanty. In review. Linking nest site selection to nest survival in greater sage-grouse.
- Loomis, J. 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. General Technical Report PNW-GTR-658. USDA Forest Service Pacific Northwest Research Station, Portland, OR. Internet website: http://www.fs.fed.us/pnw/pubs/pnw_gtr658.pdf.
- Loomis, J. 2011. What's to Know about Hypothetical Bias in Stated Preference Valuation Studies. *Journal of Economic Surveys* 25(2): 363-370.
- Loomis, J., and E. Ekstrand. 1997. Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple Bounded Contingent Valuation Survey. *Journal of Agricultural and Resource Economics* 22(2): 356-366.
- Loomis, J., and L. Richardson, 2007. Benefit Transfer and Visitor Use Estimating Models of Wildlife Recreation, Species and Habitats. Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO. Internet website: <http://dare.colostate.edu/tools/benefittransfer.aspx>.

- Lubow, B. C., and J. I. Ransom. 2009. Validating aerial survey photographic mark-recapture for naturally marked feral horses. *Journal of Wildlife Management* 73:1420-1429.
- Lyon, A. G. 2000. The potential effects of natural gas development of sage grouse hear Pinedale, Wyoming. Thesis. University of Wyoming, Laramie.
- Lyon, A. G., and S. H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. *Wildlife Society Bulletin* 31:486-491.
- Lyon County, Nevada. 2010. Comprehensive Master Plan. December 23, 2010.
- Mack, R. N., and D. A. Pyke. 1983. The demography of *Bromus tectorum*: variation in time and space. *J. Ecol.* 71:69-93.
- Mangan, N., A. Seidl, C. J. Mucklow, and D. Alpe. 2005. The Value of Ranchland to Routt County Residents 1995-2005. EDR 05-02, Economic Development Report, Dept. of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO. Internet website: <http://dare.colostate.edu/pubs/EDR/EDR05-02.pdf>.
- Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. M. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne, et al. 2013. Summary of Science, Activities, Programs and Policies that Influence the Rangeland Conservation of Greater Sage-Grouse (*Centrocercus urophasianus*). US Geological Survey Open-File Report 2013-1098, Fort Collins, Colorado.
- Manier, D. J., Z. H. Bowen, M. L. Brooks, M. L. Casazza, P. S. Coates, P. A. Deibert, S. E. Hanser, and D. H. Johnson. 2014. Conservation buffer distance estimates for Greater Sage-Grouse—A review: US Geological Survey Open-File Report 2014-1239. Internet website: <http://dx.doi.org/10.3133/ofr20141239>.
- Manly, B. F., J. L. McDonald, D. L. Thomas, T. L. McDonald, and W. P. Erickson. 2002. Resource selection by animals: statistical design and analysis for field studies. Chapman and Hall, London, UK.
- Martin, J. W., and B. A. Carlson. 1998. Sage sparrow (*Amphispiza belli*). In: A. Poole and F. Gill (editors), *The Birds of North America*, No. 326. The Birds of North America, Inc., Philadelphia, Pennsylvania.
- Martin, R. E., and D. B. Sapsis. 1991. Fires as agents of biodiversity: pyrodiversity promotes biodiversity. In: R. Harris, D. Erman, and H. Kerner (editors), *Proceedings of the Symposium on Biodiversity of Northwestern California*, Santa Rosa, California. Pp. 150-157.
- Maser, C., J. W. Thomas, and R. G. Anderson. 1984. Wildlife Habitats in Managed Rangelands—The Great Basins of Southeastern Oregon: The Relationship of Terrestrial Vertebrates to Plant Communities and Structural Conditions. General Technical Report PNW-172. US Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station.
- Masto, Catherine Cortez. 2011. Personal communication. Catherine Cortez Masto, with Ramona Morrison, Vice Chairman, Nevada Board of Agriculture. January 25, 2011.

- McEvoy, D. J., J. L. Huntington, J. Abatzoglou, L. Edwards. 2012. An Evaluation of multi-scalar drought indices in Nevada and eastern California. *Earth Interactions* 16:1-18.
- Meehan, W. R. (editor). 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society publication.
- McLean, R. G. 2006. West Nile virus in North American birds: Ornithological Monographs, v. 60, p. 44–64.
- Meents, J. K., B. W. Anderson, and R. D. Ohmart. 1982. Vegetation relationships and food of sage sparrows wintering in honey mesquite habitat. *Wilson Bull.* 94:129-138.
- Meinke, C. W., S. T. Knick, and D. A. Pyke. 2009. A spatial model to prioritize sagebrush landscapes in the intermountain west (USA) for restoration. *Restoration Ecology* 17:652-659.
- Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, editors. 2014. Climate Change Impacts in the United States: The Third National Climate Assessment. US Global Change Research Program. DOI:10.7930/J0Z31WJ2.
- Menard C., P. Duncan, G. Fleurance, J. Georges, and M. Lila. 2002. Comparative foraging and nutrition of horses and cattle in European wetlands. *Journal of Applied Ecology* 39:120-133.
- Menneer, John C., Stuart Ledgard, Chris McLay, and Warwick Silvester. 2003. The effect of a single application of cow urine on annual N₂ fixation under varying simulated grazing intensity, as measured by four ¹⁵N isotope techniques. *Plant and Soil* 254:469-480.
- METI Corp./Economic Insights of Colorado. 2012. USDA Forest Service Protocols for Delineation of Economic Impact Analysis Areas.
- Meyer, P. A., R. Lichtkoppler, R. B. Hamilton, D. A. Harpman, C. L. Borda, and P. M. Engel. 1995. Elwha River Restoration Project: Economic Analysis, Final Technical Report. Developed by the Project Human Effects Team. A Report to the US Bureau of Reclamation, National Park Service, and Lower Elwha S'Klallam Tribe. Davis, CA. Internet website: http://digital.library.ucr.edu/cdri/documents/R264_Economic_analysis.pdf.
- Miller, R. F., and L. L. Eddleman. 2000. Spatial and Temporal Changes of Sage Grouse Habitat in the Sagebrush Biome. Oregon State University Agriculture Experiment Station Technical Bulletin 151.
- Miller, R. F., and J. A. Rose. 1999. Fire history and western juniper encroachment in sagebrush steppe. *Journal of Range Management* 52:550-559.
- Miller, R. F., J. D. Bates, T. J. Svejcar, F. B. Pierson, and L. E. Eddleman. 2005. Biology, ecology and management of Western Juniper (*Juniperus occidentalis*). Oregon State University Agricultural Experiment Station. Technical Bulletin 152. 79p.

- Miller, R. F., and R. J. Tausch. 2001. The role of fire in pinyon and juniper woodlands: A descriptive analysis. *In*: K. E. M. Galley and T. P. Wilson (editors), *Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species*. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11. Tallahassee, Florida, Tall Timbers Research Station. Pp. 15-30.
- Miller, R. F., R. J. Tausch, E. D. McArthur, D. D. Johnson, and S. C. Sanderson. 2008. Age Structure and Expansion of Pinon-Juniper Woodlands: A Regional Perspective in the Intermountain West. USDA Forest Service. RMRS-RP-69.
- Miller, R. F., T. J. Svejcar, and N. E. West. 1994. Implications of livestock grazing in the intermountain sagebrush region: Plant composition. *In*: *Ecological Implications of Livestock Herbivory in the West*. Society for Range Management.
- Miller, R. F., S. T. Knick, D. A. Pyke, C. W. Meinke, S. E. Hanser, M. J. Wisdom, and A. L. Hild. 2011. Characteristics of sagebrush habitats and limitations to long-term conservation. *In*: S. T. Knick and C. J. W. (editors), *Greater sage-grouse: Ecology of a landscape species and its habitats*. Cooper Ornithological Union, University of California Press, Berkeley. Pp. 145-184.
- Miller, Richard F., Jeanne C. Chambers, David A. Pyke, Fred B. Pierson, and C. Jason Williams. 2013. A Review of Fire Effects on Vegetation and Soils in the Great Basin Region: Response and Ecological Site Characteristics. Gen. Tech. Rep. RMRS-GTR-308. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Miller, Richard F.; Jeanne C. Chambers, and Mike Pellant. 2014. A field guide for selecting the most appropriate treatment in sagebrush and piñon-juniper ecosystems in the Great Basin: Evaluating resilience to disturbance and resistance to invasive annual grasses, and predicting vegetation response. Gen. Tech. Rep. RMRS-GTR-322. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Mitchell, R., and R. Carson. 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. Resources for the Future, Washington DC.
- Modoc County. 1988. Modoc County General Plan. Alturas, California.
- _____. 1995. Comprehensive Land Use Plan.
- Montana Sage Grouse Working Group. 2005. Management Plan and Conservation Strategies for Sage Grouse in Montana-Final. Revised February 1, 2005.
- Mote, P. W., A. F. Hamlet, M. P. Clark, D. P. Lettenmaier. 2005. Declining mountain snowpack in western North America. *Bulletin of the American Meteorological Society* 86:39-49.

- Mountain Home Air Force Base. 2012. Integrated Natural Resources Management Plan for Mountain Home Air Force Base, Small Arms Range, Saylor Creek Air Force Range, Juniper Butte Range, and other Mountain Home Range Complex Sites. June 2012. Internet website: <http://www.mountainhome.af.mil/shared/media/document/AFD-120824-035.pdf>. Accessed on September 25, 2012.
- Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of Greater Sage-Grouse in northcentral Montana. *Journal of Wildlife Management* 71:1773–1783.
- Mueggler, W. F. 1950. Effects of spring and fall grazing by sheep on vegetation of the upper Snake River plains. *Journal of Range Management*, v. 3, p. 308–315.
- Murphy, J. J., P. G. Allen, T. H. Stevens, and D. Weatherhead. 2005. A meta-analysis of hypothetical bias in stated preference valuation. *Environmental and Resource Economics* 30: 313-325.
- Myers, Lewis H. 1989. Grazing and riparian management in Southwestern Montana. In: Gresswell, R. E., B.A. Barton and J. L. Kershner (eds). 1989. Practical approaches to riparian resource management, workshop proceedings, Bureau of Land Management, Billings, MT.
- NACO (National Association of Counties). 2012. Find a county. Internet website: <http://www.naco.org/counties/pages/findacounty.aspx>.
- _____. 2013. Policy Brief. Continue mandatory funding for the payment in lieu of taxes (PILT) program. Internet website: <http://www.naco.org/legislation/policies/Documents/PublicLands/ry--pilt.pdf>
- Naiman, R., H. Decamps, and M. Pollock. 1992. The Role of Riparian Corridors in Maintaining Regional Biodiversity. *Ecological Applications*, 3:209-212.
- National Center for Education Statistics. 2012. Public school revenue sources. Internet website: http://nces.ed.gov/programs/coe/indicator_sft.asp.
- National Fire Planning Operations Reporting System. Data included 2008-2012.
- National Research Council. 2002. Riparian Areas: Functions and Strategies for Management. National Academy of Science. Washington, DC.
- Natural Resource Industry Institute. 2011. An Economic Overview of Nevada's Minerals Industry, 2010-2011. Internet website: http://www.nevadamining.org/issues_policy/pdfs/NVMA_2010_Economic_Overview.pdf.
- Naugle, D. E., C. L. Aldridge, B. L. Walker, T. E. Cornish, B. J. Moynahan, M. J. Holloran, K. Brown, et al. 2004. West Nile virus—Pending crisis for Greater Sage-Grouse. *Ecology Letters*, v. 7, p. 704–713.
- Naugle, D. E., C. L. Aldridge, B. L. Walker, K. E. Doherty, M. R. Matchett, J. McIntosh, T. E. Cornish, and M. S. Boyce. 2005. West Nile virus and sage-grouse—What more have we learned? *Wildlife Society Bulletin* v. 33, p. 616–623.

- Naugle, D. E., K. E. Doherty, B. L. Walker, M. J. Holloran, and H. E. Copeland. 2011. Energy development and greater sage-grouse. *In*: S. T. Knick and C. J. W. (editors), Greater sage-grouse: Ecology of a landscape species and its habitats. Cooper Ornithological Union, University of California Press, Berkeley. Pp. 489-504.
- NCSL (National Conference of State Legislatures). 2013. Federal and state recognized tribes. Internet website: <http://www.ncsl.org/issues-research/tribal/list-of-federal-and-state-recognized-tribes.aspx>.
- NDA (Nevada Department of Agriculture). 2013. Letter from Director Jim Barbee. RE: Justification for increase of Pesticide Registration Fee NAC 586.011. February 19, 2013.
- NDOW (Nevada Department of Wildlife). 1986. Desatoya Range Bighorn Sheep Habitat Management Plan. Reno, NV.
- _____. 1993. Big Game Habitat Management Plan. 1993.
- _____. 1997. Elk Species Management Plan. February 8, 1997.
- _____. 1999a. Lincoln County Elk Management Plan. July 1999.
- _____. 1999b. Pahrangat Valley Native Fishes Management Plan.
- _____. 1999c. White Pine County Elk Management Plan. March 1999.
- _____. 2001. Bighorn Sheep Management Plan. Reno, Nevada. October 2001.
- _____. 2002. Population Management Unit (PMU) boundaries.
- _____. 2004a. Lahontan Cutthroat Trout Species Management Plan for the Upper Humboldt River Drainage Basin. December 2004.
- _____. 2004b. Greater Sage-Grouse Conservation Plan for Nevada and Eastern California. First edition: June 30, 2004.
- _____. 2006a. Management Plan for Mule Deer.
- _____. 2006b. Conservation Agreement and Conservation Strategy for Bonneville Cutthroat Trout.
- _____. 2012a. Nevada Sage-Grouse Conservation Project, Interim Performance Report. December 2012.
- _____. 2012b. Greater Sage-Grouse Habitat Categorization Executive Summary.
- _____. 2013. Wildlife Action Plan. Wildlife Action Plan Team. January 2013.
- _____. 2014. Personal Communication between Shawn Espinosa, NDOW and Arlene Kotic, BLM. March 2014.

- NDOW and CDFW. 2012. Unpublished and internal lek site data from NDOW Chet Van Dillon (CDFW) and Brian Ehler (CDFW), modified by California BLM to reflect most current data.
- Neary, Daniel G., Kevin C. Ryan, Leonard F. DeBano (editors). 2005 (revised 2008). *Wildland Fire in Ecosystems: Effects of Fire on Soils and Water*. Gen. Tech. Rep. RMRS-GTR-42-vol.4. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, Utah.
- Neel, L. A. 1980. Sage grouse response to grazing management in Nevada. M. S. Thesis. Univ. of Nevada, Reno.
- Neilson, R. P., J. M. Lenihan, D. Bachelet, and R. J. Drapek. 2005. Climate change implications for sagebrush ecosystems. *Transactions of the North American Wildlife and Natural Resources Conference* 70:145-159.
- Nelle, P. J., K. P. Reese, and J. W. Connelly. 2000. The long-term effect of fire on sage grouse nesting and brood-rearing habitats on the Upper Snake River Plain. *Journal of Range Management* 53:586-591.
- State of Nevada. 2001. Nevada Sage-Grouse Conservation Strategy. Carson City, NV. October 2001.
- _____. 2004. State of Nevada Sage Grouse Conservation Team. Greater Sage-Grouse Conservation Plan for Nevada and Eastern California. 1st ed. 2004. Carson City, NV.
- _____. 2012. State of Nevada Strategic Plan for Conservation of Greater Sage-Grouse. Governor's Sage-Grouse Advisory Committee. Carson City, NV. July 31, 2012.
- _____. 2014. Nevada Greater Sage-Grouse Conservation Plan. Sagebrush Ecosystem Program. Carson City, NV. October 1, 2014.
- Nevada Bat Working Group. 2006. Revised Nevada Bat Conservation Plan. Reno, Nevada.
- Nevada Bureau of Mines and Geology. Undated. Nevada Bureau of Mines and Geology Oil and Gas Historical Summary (Modified from NBMG Bulletin 104, 1988). Internet website: <http://www.nbmgnr.edu/Oil&Gas/HistoricalSummary.html>. Accessed on September 4, 2013.
- _____. 2000. Geothermal Resources in Nevada. Map 126. Prepared in cooperation with the Nevada Division of Minerals and the US Department of Energy. Internet website: <http://www.nbmgnr.edu/dox/m126.pdf>.
- _____. 2005. Geothermal Potential Map of The Great Basin Region, Western United States. Internet website: <http://www.nbmgnr.edu/dox/m151/m151plate.pdf>.
- _____. 2010. The Nevada Mining Industry. Internet website: <http://www.nbmgnr.edu/dox/mi10.pdf>.
- Nevada Department of Conservation and Natural Resources. 1985. Nevada Summary Policy Plan for Public Lands. Division of State Lands. Carson City, Nevada.

-
- _____. 1993. State of Nevada Drought Plan. Department of Conservation and Natural Resources, Division of Water Planning. Carson City, Nevada.
- _____. 1999. Lands Identified for Public Acquisition. Division of State Lands. Carson City, Nevada.
- _____. 2003. Nevada's 2003 Statewide Comprehensive Outdoor Recreation Plan—Assessment and Policy Plan. Division of State Parks. Carson City, Nevada.
- _____. 2012. Applying the Sage-Grouse Fence Collision Risk Tool to Reduce Bird Strikes. NRCS/CEAP Conservation Insight Publication. November 2012. Internet website: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1049415.pdf.
- _____. 2015. Outcomes in Conservation: Sage Grouse Initiative. February 2015. Internet website: http://www.sagegrouseinitiative.com/wp-content/uploads/2015/02/NRCS_SGI_Report.pdf
- Nevada Department of Employment, Training, and Rehabilitation. 2013a. Reno Sparks MSA—Long-Term Industrial Employment and Projections, 2010-2020. Research and Analysis Bureau. Internet website: <http://www.nevadaworkforce.com/?PAGEID=67&SUBID=197>. Accessed in June 2013.
- _____. 2013b. Western Central Counties - Long Term Industrial Employment and Projections, 2010-2020. Research and Analysis Bureau. Internet website: <http://www.nevadaworkforce.com/?PAGEID=67&SUBID=197>. Accessed in June 2013.
- _____. 2013c. Balance of State Long-Term Industrial Employment and Projections, 2008-2018. Research and Analysis Bureau. Internet website: <http://www.nevadaworkforce.com/?PAGEID=67&SUBID=197>. Accessed in June 2013.
- Nevada Department of Taxation. 2012. Annual Report Fiscal 2010-2011. Internet website: [http://tax.state.nv.us/pubs.htm#annual report](http://tax.state.nv.us/pubs.htm#annual%20report).
- Nevada Division of Environmental Protection. 1999. Smoke Management Program Plan. Bureau of Air Quality Planning. Carson City, Nevada.
- _____. 2007. Solid Waste Management Plan. Carson City, Nevada.
- Nevada Governor's Sage-Grouse Conservation Team. 2004. Greater Sage-Grouse Conservation Plan for Nevada and Eastern California. Internet website: <http://www.ndow.org/wild/conservation/sg/plan>.
- _____. 2010. Nevada energy and infrastructure development standards to conserve greater sage-grouse populations and their habitats. Carson City, NV. Pp. 9-11.
- Nevada Indian Territory. 2012. Indian Territory Brochure. Internet website: <http://www.nevadaindianterritory.com/images/IndianTerritoryBrochure.pdf>.
- Nevada Mining Association. 2010. Issues and Policy: Taxation. Internet website: http://www.nevadamining.org/issues_policy/taxation.php.

- Nevada State Historic Preservation Office. 2003. Nevada Comprehensive Preservation Plan. Carson City, Nevada.
- Nevada Weed Action Committee. 2000. Nevada's Coordinated Invasive Weed Strategy. Carson City, Nevada.
- Northeast California Sage-Grouse Working Group. 2006a. Conservation Strategy for Sage-Grouse (*Centrocercus urophasianus*) and Sagebrush Ecosystems within the Massacre Population Management Unit.
- _____. 2006b. Conservation Strategy for Sage-Grouse (*Centrocercus urophasianus*) and Sagebrush Ecosystems within the Vya Population Management Unit.
- NPS (US Department of the Interior, National Park Service). 1997. National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation. US Department of the Interior, National Park Service. Washington, DC.
- _____. 2012. California National Historic Trail. Internet website: <http://www.nps.gov/cali/planyourvisit/directions.htm>. Accessed on November 26, 2012.
- NRCS (Natural Resources Conservation Service). 2011. Practice Documentation Guide 528-1: Prescribed Grazing. March 2011.
- _____. 2012. Sage-Grouse Initiative Status Report Fiscal Year 2010-2011.
- _____. 2015. Outcomes in Conservation: Sage Grouse Initiative. February 2015. Internet website: http://www.sagegrouseinitiative.com/wp-content/uploads/2015/02/NRCS_SGI_Report.pdf
- NREL (National Renewable Energy Laboratory). 2012. Classes of Wind Power Density at 10m and 50m. Internet website: <http://rredc.nrel.gov/wind/pubs/atlas/tables/1-IT.html>. Accessed December 2012.
- _____. 2015. Solar Maps. Updated February 2, 2015. Internet website: <http://www.nrel.gov/gis/solar.html>. Accessed on April 14, 2015.
- NTT (National Technical Team). 2011. A Report on National Greater Sage-Grouse Conservation Measures. Produced by the Sage-Grouse National Technical Team. Washington DC. December 21, 2011.
- NV Energy. 2013. Geothermal Projects. Internet website: <https://www.nvenergy.com/renewables/environment/renewables/geothermal.cfm>.
- _____. 2014. Geothermal Projects. Internet website: <https://www.nvenergy.com/renewablesenvironment/renewables/geothermal.cfm>
- Nye County (Nevada). 1996. Tri-Party Framework for Interactions to Address Public Lands Issues in Nye County. August 14, 1997.

- _____. 2009. Title 7 of the Nye County Code (Comprehensive Land Use and Management Plan for Federal and State Lands within Nye County). August 24, 2009.
- _____. 2011. Comprehensive Master Plan. June 7, 2011. Internet website: <http://www.nyecounty.net/DocumentCenter/Home/View/14049>.
- _____. 2012. Personal communication. Levi Kryder (Nye County) to Brian Amme (BLM), September 2012.
- Oakleaf, R. J. 1971. Relationship of sage grouse to upland meadows in Nevada. Master's Thesis. University of Nevada, Reno.
- OCCRI (Oregon Climate Change Research Institute). 2010. *Oregon Climate Assessment Report*. K. D. Dello and P. W. Mote (eds). College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR.
- Olmstead, David L., and Omer C. Stewart. 1978. Achumawi. In: R. F. Heizer (editor), *Handbook of North American Indians, Volume 8: California*. Smithsonian Institution Press, Washington, DC. Pp. 225-235.
- ONRR (US Department of the Interior, Office of Natural Resources Revenue). 2012. Personal communication. Nathan Brannberg, ONRR, to Josh Sidon, BLM, July 26, 2012.
- Ormat. 2012. Ormat announces commercial operation of Mcginness Hills geothermal power plant. Internet website: <http://www.ormat.com/news/latest-items/ormat-announces-commercial-operation-mcginness-hills-geothermal-power-plant>.
- Osborn, Stephen G., Avner Vengosh, Nathaniel R. Warner, and Robert B. Jackson. 2011. Methane Contamination of drinking water accompanying gas-well drilling and hydraulic fracturing. *Proceedings of the National Academy of Sciences of the United States of America*. Vol. 108, No. 20 (May 17, 2011): 8172-8176.
- Owens, M. K., and B. E. Norton. 1990. Survival of juvenile basin sagebrush under different grazing regimes: *Journal of Range Management* 43:32-135.
- Owyhee County. 2013. Sage-Grouse Management Plan. Owyhee County, Idaho. April 8, 2013.
- Paige, C., and S. A. Ritter. 1998. Birds in a Sagebrush Sea: Managing Sagebrush Habitats for Bird Communities. Western Working Group of Partners in Flight, Boise, Idaho.
- Painter, T. H., A. P. Barrett, C. C. Landry, J. C. Neff, M. P. Cassidy, C. R. Lawrence, K. E. McBride, and G. L. Farmer. 2007. Impact of disturbed desert soils on duration of mountain snow cover. *Geophysical Research Letters*, Vol. 34, L12502, DOI:10.1029/2007GL030284.
- Parmalee, Paul W. 1970. Birds from Hogup Cave. In: C. Melvin Aikens (editor), *Hogup Cave*. Anthropological Papers No. 93. University of Utah Press, Salt Lake City. Pp. 263-266.

- _____. 1988a. Avian remains from Danger Cave. In: Donald K. Grayson (editor), *Danger Cave, Last Supper Cave, and Hanging Rock Shelter: The Faunas*. Anthropological Papers 66 (Part 1). American Museum of Natural History, New York, New York. Pp. 37-43.
- _____. 1988b. Mollusks and birds from Last Supper Cave. In: Donald K. Grayson (editor), *Danger Cave, Last Supper Cave, and Hanging Rock Shelter: The Faunas*. Anthropological Papers 66 (Part 1). American Museum of Natural History, New York, New York. Pp. 75-80.
- Patricelli, Gail L., J. L. Blickley, S. Hooper. 2013. Incorporating the Impacts of Noise Pollution into Greater Sage-Grouse Conservation Planning. Department of Evolution and Ecology. University of California, Davis.
- Patterson, R. L. 1952. *The Sage Grouse in Wyoming*. Wyoming Game and Fish Commission, Sage Books Inc., Denver, Colorado.
- Payne, G. F., J. W. Foster, and W. C. Leininger. 1983. Vehicle impacts on northern Great Plains range vegetation. *Journal of Range Management* 36:327-331.
- Pellant, M. 1990. The cheatgrass-wildfire cycle—Are there any solutions? In: E. Durant McArthur, Evan M. Romney, Stanley D. Smith, Paul T. Tueller (compilers), *Proceedings—Symposium on Cheatgrass Invasion, Shrub Die-Off, and Other Aspects of Shrub Biology and Management*, Las Vegas, Nevada. Gen. Tech. Rep. INT-276. US Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah. April 5-7, 1989. Pp. 11-17.
- _____. 1996. Use of indicators to qualitatively assess rangeland health. In: N. E. West (editor), *Rangelands in a Sustainable Biosphere. Proc. 5th International Rangeland Congress*. Society for Range Management, Denver, Colorado. Pp. 434-435.
- _____. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. US Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. BLM/WO/ST-00/001+1734/REV05.
- Pellegrini, S. (1971). Home Range, Territoriality and Movement Patterns of Wild Horses in the Wassuk Range of Western Nevada. Master's Thesis. University of Nevada, Reno.
- Perryman, B., Bruce, L., Tueller, P., and Swanson, S. (2006). Ranchers' Monitoring Guide. Reno, NV: University of Nevada, Cooperative Extension. Educational Bulletin-06-04, 48pp., <http://www.unce.unr.edu/publications/files/ag/2006/eb0604.pdf>.
- Pershing County. 2002. Master Plan. April 5, 2002. Internet website: http://pershingcounty.net/images/stories/pc_files/planning/Pershing_County_Master_Plan_2002.pdf.
- _____. 2010. Natural Resources Management Plan: Natural Resources and Federal or State Land Use. October 22, 2010.
- Petersen, B. E. 1980. Breeding and nesting ecology of female sage grouse in North Park, Colorado. Thesis. Colorado State University, Fort Collins, USA.

- Petersen, K. L., and L. B. Best. 1985. Nest-site selection by sage sparrows. *Condor* 87:217-221.
- Petersen, S. L., T. K. Stringham, and B. A. Roundy. 2009. A process-based application of state-and-transition models: A case study of western juniper (*Juniperus occidentalis*) encroachment. *Rangeland Ecology & Management* 62:186-192.
- Platts, W. S. 1990. Fish, wildlife, and livestock: Protection of riparian areas. In: *Western Wildlands*. Summer 1990. Pp. 16-19.
- Pimm, S. L., and M. E. Gilpin. 1989. Theoretical issues in conservation biology. Pp. 287-305 in J. Roughgarden, R. M. May, and S. A. Levin, eds. *Perspectives in Ecological Theory*. Princeton Univ. Press, Princeton, NJ.
- Plummer, M. 2003. JAGS: a program for analysis of Bayesian graphical models using Gibbs sampling. Internet website: <http://mcmc-jags.sf.net>.
- _____. 2014. RJAGS: Bayesian graphical models using MCMC. R Package version 3-14. Internet website: <http://CRAN.R-project.org/package=rjags>.
- Pollock, K. H., and W. L. Kendall. 1987. Visibility bias in aerial surveys: A review of estimation procedures. *Journal of Wildlife Management*. 51:502-510.
- Popham, G. P., and R. J. Gutierrez. 2003. Greater sage-grouse (*Centrocercus urophasianus*) nesting success and habitat use in northeastern California. *Wildlife Biology* 9:327-334.
- Prichard, D., H. Barrett, J. Cagney, R. Clark, J. Fogg, K. Gebhardt, P. Hansen, et al. 1993. Riparian Area Management: Process for Assessing Proper Functioning Condition. TR 1737-9. Bureau of Land Management, BLM/SC/ST-93/003+1737, Service Center, Lakewood, Colorado.
- Prichard, D., D. Bridges, S. Leonard, R. Krapf, and W. Hagenbuck. 1994. Riparian Area Management: Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas. TR 1737-11. Bureau of Land Management, BLM/SC/ST-94/008+1737, Service Center, Lakewood, Colorado.
- Prichard, Don, et al. 1998. Riparian Area Management. A User Guide to Assessing Proper Function Condition and the Supporting Science for Lotic Areas. Technical Reference 1737-15, Bureau of Land Management, Denver, Colorado.
- Prichard, Don, et al. 1999. Revised, 2003. Riparian Area Management. A User Guide to Assessing Proper Function Condition and the Supporting Science for Lentic Areas. Technical Reference 1737-16, Bureau of Land Management, Denver, Colorado.
- Pimm, S. L., and Gilpin, M. E. 1989. Theoretical issues in conservation biology. pp. 287-305 in J. Roughgarden, R. M. May, and S. A. Levin, eds. *Perspectives in Ecological Theory*. Princeton Univ. Press, Princeton, NJ.

- Pruett, C. L., M. A. Patten, and D. H. Wolfe. 2009. Avoidance behavior by prairie grouse: Implications for development of wind energy. *Conservation Biology* 23:1253-1259.
- PSC (Public Service Commission of Wisconsin). 2011. Underground Electric Transmission Lines. Internet website: <https://psc.wi.gov/thelibrary/publications/electric/electric11.pdf>.
- Pyke, D. A. 2011. Restoring and rehabilitating sagebrush habitats. In: S. T. Knick and J. W. Connelly (editors), Greater sage-grouse: ecology and conservation of a landscape species and its habitats. *Studies in Avian Biology* 38. University of California Press, Berkeley. Pp. 531-548.
- Pyle, W. J., and J. A. Crawford. 1996. Availability of foods of sage grouse chicks following prescribed fire in sagebrush-bitterbrush. *Journal of Range Management* 49(4):320-324.
- Pyne. 2004. Pyromancy: Reading stories in the flames. *Conservation Biology* 18: 874-877.
- Pyramid Lake Paiute Tribe and USDA (US Department of Agriculture). 2005. Pyramid Lake Indian Reservation Comprehensive Resource Management Plan. Washoe County, Nevada.
- Quinn, L., J. Whittingham, J. Butler, and W. Cresswell. 2006. Noise, predation risk compensation and vigilance in the chaffinch *Fringilla coelebs*. *Journal of Avian Biology* 37:601-608.
- Rabin et al 2006. Rabin, L. A., R. G. Coss, and D. H. Owings. 2006. The effects of wind turbines on antipredator behavior in California ground squirrels (*Spermophilus beecheyi*). *Biological Conservation* 131:410-420.
- Reaves, D. W., R. Kramer, and T. Holmes. 1999. Does Question Format Matter? Valuing an Endangered Species. *Environmental and Resource Economics* 14: 365-383.
- Redmond, Kelly T. Great Basin weather and climate: Winter recap, current status, summer prospects. *Great Basin Climate Forum* (conference). Reno, Nevada. May 3, 2013.
- R Core Team. 2014. R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Internet website: <http://www.R-project.org>.
- Reed, F., R. Roath, and D. Bradford. 1999. The Grazing Response Index: A Simple and Effective Method to Evaluate Grazing Impacts. *Rangelands* 21(4):3-6.
- Reichler, Thomas, and Kim Junsu. 2008. How well do coupled models simulate today's climate? *Bull. Amer. Meteor. Soc.* 89:303-311.
- Reinkensmeyer, D. P. 2000. Habitat associations of bird communities in shrub-steppe and western juniper woodlands. Master's thesis. Oregon State University, Corvallis.
- Reisner, Michael D., James B. Grace, David A. Pyke, and Paul Doescher. 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology* 10.1111/1365-2664.12097.

- Renewable Northwest Project. 2015. Renewable Energy Projects Database and Map. Internet website: http://www.rnp.org/project_map?field_project_state_value%5B%5D=OR&tid%5B%5D=9&field_project_opstatus_value%5B%5D=Approved&field_project_opstatus_value%5B%5D=Proposed&field_project_opstatus_value%5B%5D=Operating&field_project_opstatus_value%5B%5D=In+Permitting+Process&field_project_opstatus_value%5B%5D=Under+Construction. Accessed on April 15, 2015.
- Repasky, R. R., and D. Schluter. 1994. Habitat distributions of wintering sparrows along an elevational gradient: Tests of the food, predation and microhabitat structure hypotheses. *Journal of Animal Ecology* 63:569-582.
- Reynolds, T. D. 1981. Nesting of the sage thrasher, sage sparrow, and Brewer's sparrow in southeastern Idaho. *Condor* 83:61-64.
- Rhodes, E. C., J. D. Bates, R. N. Sharp, and K. W. Davies. 2010. Fire effects on cover and dietary resources of sage-grouse habitat. *Journal of Wildlife Management* 74:755-764.
- Rich, T. D. 1980. Nest placement in sage thrashers, sage sparrows and Brewer's sparrows. *The Wilson Bulletin* 92:362-368.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, et al. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, New York. Internet website: http://www.partnersinflight.org/cont_plan/. Accessed on September 4, 2013.
- Richards, R. T., J. C. Chambers, and C. Ross. 1998. Use of native plants on federal lands: Policy and practice. *Journal of Range Management* 51:625-632.
- Richardson, L., and J. Loomis. 2009. The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68: 1535-1548.
- Rickard, W. H. 1970. Ground-dwelling beetles in burned and unburned vegetation. *Journal of Range Management* 23:293-294.
- Rimbey, Neil R., L. Allen Torell, and John A. Tanaka. 2007. Why grazing permits have economic value. *Journal of Agricultural and Resource Economics* 32(1):20-40.
- Ripple, William J., Pete Smith, Helmut Haberl, Stephen A. Montzka, Clive McAlpine and Douglas H. Boucher. 2014. Ruminants, climate change and climate policy. *Nature Climate Change* 4:2-5.
- Rishel, G. B., J. A. Lynch, and E. S. Corbett. 1982. Seasonal stream temperature changes following forest harvesting. *Journal of Environmental Quality* 11:112-116.
- Rittenhouse, L., D. Johnson, and M. Borman. 1982. A Study of Food Consumption Rates and Nutrition of Horses and Cattle. Washington, DC: Bureau of Land Management.

- Rosenberger, R. 2012. Recreation Use Values Database. Internet website: http://recvaluation.forestry.oregonstate.edu/sites/default/files/RECREATION_USE_VALUES_DATABASE_%20SUMMARY.pdf. Accessed on October 13, 2012.
- Rosenberger, R., and J. Loomis. 2000. Using Meta-Analysis for Benefit Transfer: In-Sample Convergent Validity Tests of an Outdoor Recreation Database. *Water Resources Research* 36(4): 1097-1107.
- Rosgen, D. L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. *Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision*.
- Rotenberry, J. T., and J. A. Wiens. 1980. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. *Ecology* 61:1228-1250.
- Roundy, B. A., K. Young, N. Cline, A. Hulet, R. F. Miller, and B. Rau. 2014. Piñon-Juniper Reduction Increases Soil Water Availability of the Resource Growth Pool. *Rangeland Ecology and Management* 67(5):495-505. DOI:10.2111/REM-D-13-00022.1.
- Rowland, M. M., L. H. Suring, and M. J. Wisdom. 2010. Assessment of Habitat Threats to Shrublands in the Great Basin: A Case Study. In: J. M. Pye, H. M. Rauscher, Y. Sands, D. C. Lee, and J. S. Beatty (editors), *Environmental Threat Assessment and Application to Forest and Rangeland Management*. US Forest Service, General Technical Report, PNW, Bozeman, Montana. Pp. 673-685.
- Sada, Don, et al. 2001. Riparian Area Management, A Guide to Managing, Restoring and Conserving Springs in the Western United States. Technical Reference 1737-17, Bureau of Land Management, Denver, Colorado.
- Sage-Grouse Conservation Team. 2004. Greater Sage-Grouse Conservation Plan for Nevada and Eastern California. Prepared for Nevada Governor Kenny C. Guinn. First Edition. June 30, 2004.
- Sather-Blair, S., P. Makela, T. Carrigan, and L. Anderson. 2000. A Framework to Assist in Making Sensitive Species Habitat Assessments for BLM-Administered Public Land in Idaho: Sage Grouse (*Centrocercus urophasianus*). US Department of the Interior, Bureau of Land Management, Idaho.
- Savage, D. E. 1968. The relationship of sage grouse to upland meadows in Nevada. Master's Thesis. University of Nevada, Reno.
- Sawyer, J. O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, California.
- Schaefer, R. J., D. J. Thayer, and T. S. Burton. 2003. Forty-one years of vegetation change on permanent transects in northeastern California: Implications for wildlife. *California Fish and Game* 89(2):55-71.
- Schmidt, Kirsten M., James P. Menakis, Colin C. Hardy, Wendall J. Hann, and David L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.

- Schoenberg, T. J. 1982. Sage grouse movements and habitat selection in North Park, Colorado. Master's thesis. Colorado State University, Fort Collins, Colorado.
- Schroeder, M. A. 1995. Productivity and Habitat Use of Sage Grouse in North-Central Washington. Washington Department of Fish and Wildlife, Job Progress Report Project W-96-R, Olympia, Washington.
- Schroeder, M. A., and R. K. Baydack. 2001. Predation and the management of prairie grouse. *Wildlife Society Bulletin* 29:24-32.
- Schroeder, M. A., J. R. Young, and C. E. Braun. 1999. Sage grouse (*Centrocercus urophasianus*). In: A. Poole and F. Gill (editors), *The Birds of North America*, No. 425. The Birds of North America, Inc., Philadelphia, Pennsylvania.
- Schroeder, M. A., C. L. Aldridge, A. D. Apa, J. R. Bohne, C. E. Braun, S. D. Bunnell, J. W. Connelly, et al. 2004. Distribution of sage grouse in North America. *Condor* 106:363-376.
- Scott, J. M., and D. S. Wilcove. 1998. Improving the future for endangered species. *Bioscience* 48 (8): 579-580.
- SETT (NV Sagebrush Ecosystem Technical Team). 2014a.
- Nevada Natural Heritage Program and the Sagebrush Ecosystem Technical Team. 2014. *Nevada Conservation Credit System Manual v0.98*. Prepared by Environmental Incentives, LLC. South Lake Tahoe, CA.
- _____. 2014b. *Nevada Habitat Quantification Tool Scientific Methods Document v0.98*. Prepared by Environmental Incentives, LLC and EcoMetrix Solutions Group, LLC.
- Sevon, M., J. French, J. Curran, and R. Phoenix. 1999. Lahontan Cutthroat Trout Species Management Plan for the Quinn River/Black Rock Basins and North Fork Little Humboldt River Sub-Basin. Nevada Department of Wildlife, Federal Aid Project F-20-27 Job 113-P. Carson City, NV.
- Shasta County. 2004. General Plan. September 2004.
- Sheley, Roger L., and Janet K. Petroff. 1999. *Biology and Management of Noxious Rangeland Weeds*. Oregon State University Press, Corvallis. Pp. 85-96.
- Shevenell, Lisa. 2012. The Rate of Success of Geothermal Wells Drilled in Nevada 129-139. Internet website: <http://www.epa.gov/cmop/docs/dir-drilling.pdf>, page 2.
- Shlisky, A., J. Waugh, P. Gonzalez, M. Gonzalez, M. Manta, H. Santoso, E. Alvarado, et al. 2007. Fire, Ecosystems and People: Threats and Strategies for Global Biodiversity Conservation. The Nature Conservancy Global Fire Initiative Technical Report 2007-2.
- Short, Karen C. 2013. A Spatial Database of Wildfires in the United States, 1992-2011 [FPA_FOD_20130422]. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado.

- Shultz, B., and K. McAdoo. 2002. Common Sagebrush in Nevada. University of Nevada, Reno. SP-02-02.
- Siniff, D. B., J. R. Tester, R. D. Cook, and G. L. McMahon. 1982. Census Methods for Wild Horses and Burros: Final Report. Minneapolis: University of Minnesota.
- Siskiyou County. 2010. Siskiyou County General Plan. Yreka, California.
- Sousa, W. P. 1984. The role of disturbance in natural communities. *Annual Review Ecological Systems* 15:353-391.
- Strand, Eva K., et al. 2014. Livestock Grazing Effects on Fuel Loads for Wildland Fire in Sagebrush Dominated Ecosystems, Volume I. *Journal of Rangeland Applications*.
- State of Montana. 2014. Executive Order No. 10-2014: Creating the Montana Sage Grouse Oversight Team and the Montana Sage Grouse Habitat Conservation Program. Office of the Governor. Internet website: governor.mt.gov/Portals/16/docs/2014EOs/EO_10_2014_SageGrouse.pdf. September 9.
- State of Nevada. 2013. Sagebrush Ecosystem Program. Internet website: <http://sagebrusheco.nv.gov/NH/>.
- Stephens, S. L., J. J. Moghaddas, C. Edminster, C. E. Fiedler, S. Hasse, M. Harrington, J. E. Keeley, et al. 2009. Fire treatment effects on vegetation structure, fuels and potential fire severity in western US forests. *Ecological Applications* 19(2):305-320.
- Stevens, B. S. 2011. Impacts of fences on greater sage-grouse in Idaho: Collision, mitigation, and spatial ecology. Thesis. University of Idaho, Moscow.
- Stevens, B. S., K. P. Reese, and J. W. Connelly. 2011. Survival and detectability bias of avian fence collision surveys in sagebrush steppe. *Journal of Wildlife Management* 75(2):437-449.
- Stevens, T., J. Echeverria, R. Glass, T. Hager, and T. Moore. 1991. Measuring the Existence Value of Wildlife. *Land Economics* 67(4): 390-400.
- Steward, Julian H. 1936. Myths of the Owens Valley Paiute. *University of California Publications in American Archaeology and Ethnology* Vol. 34, No. 5:355-440.
- _____. 1941. Culture element distributions: XIII Nevada Shoshone. *Anthropological Records* Vol. 4, No. 2:209-360. University of California Press, Berkeley.
- _____. 1943. Culture element distributions: XXIII Northern and Gosiute Shoshoni. *Anthropological Records* Vol. 8, No. 3:263-392. University of California Press, Berkeley.
- Stewart, Omer. 1941. Culture element distributions: XIV Northern Paiute. *Anthropological Records* Vol. 4, No. 3:361-446. University of California Press, Berkeley.
- Stiver, S. J. 2011. The legal status of greater sage-grouse: Organizational structure of planning efforts. Pp. 33-49. In: S. T. Knick and J. W. Connelly (eds.) Greater Sage-Grouse: Ecology of a Landscape Species and Its Habitats. Cooper Ornithological Union, University of California Press, Berkeley.

- Stiver, S. J., A. D. Apa, J. R. Bohne, S. D. Bunnell, P. A. Deibert, S. C. Gardner, M. A. Hilliard, et al. 2006. Greater Sage-Grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpublished report. Cheyenne, Wyoming.
- Stiver, S. J., E. T. Rinkes, and D. E. Naugle. 2010. Sage-Grouse Habitat Assessment Framework: Multiscale Habitat Assessment Tool. US Bureau of Land Management Report, Idaho State Office, Boise.
- Stoddart, L., A. Smith, and T. Box. 1975. Range Management. New York, NY: McGraw-Hill.
- Storey County (Nevada). 1994. Master Plan. April 21, 1994.
- Strand E. K., and K. L. Launchbaugh. 2013. Livestock Grazing Effects on Fuel Loads for Wildland Fire in Sagebrush Dominated Ecosystems. *Great Basin Fire Science Delivery Report*. April 2013.
- Strand, E., K. L. Launchbaugh, R. Limb, and L. A. Torell. 2014. Livestock grazing effects on fuel loads for wildland fire in sagebrush dominated ecosystems. *Journal of Rangeland Management* (1):35-57.
- Strawberry Valley Adaptive Resource Management Local Working Group (SVARM). 2006. Strawberry Valley Greater Sage-grouse (*Centrocercus urophasianus*) Local Conservation Plan. Utah State University Extension and Jack H. Berryman Institute and Utah Division of Wildlife Resources. Salt Lake City, Utah. Unpublished report.
- Swanson, S., B. Bruce, R. Cleary, B. Dragt, G. Brackley, G. Fults, and D. Wilson. 2006. Nevada Rangeland Monitoring Handbook, 2nd. Edition. University of Nevada, Cooperative Extension, Natural Resources Conservation Service, Bureau of Land Management, and US Forest Service. Educational Bulletin 06-03. Internet website: <https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf>.
- Summit Lake Paiute Tribal Council, Summit Lake Land Use Committee, and Lumose and Associates, Inc. 2000. Summit Lake Paiute Land Use Plan. Summit Lake Paiute Council of the Summit Lake Paiute Tribe, Summit Lake Indian Reservation, Nevada.
- Sveum, C. M., J. A. Crawford, and W. D. Edge. 1998. Use and selection of brood-rearing habitat by sage grouse in south-central Washington. *Great Basin Naturalist* 58:344-351.
- Symanski, R. 1994. Contested Realities: Feral Horses in Outback Australia. *Annals of the Association of American Geographers* 84:251-269.
- Tack, J. D. 2009. Sage grouse and the human footprint: implications for conservation of small and declining populations. Thesis. University of Montana, Missoula, Montana, USA.
- Tanaka, J., L. A. Torell, and N. Rimbey. 2005. Who Are Public Land Ranchers and Why are They Out There? *Western Economic Forum* 14-20. Fall 2005.
- Tang, Guoping, and John A. Arnone, III. 2013. Trends in surface air temperature extremes in the Great Basin during the 20th century from ground-based observations. *Journal of Geophysical Research: Atmospheres*, SN 2169-8996. Unpublished manuscript accepted March 27, 2013.

- Tausch, R. J., and R. S. Nowak. 1999. Fifty Years of Ecotone Change Between Shrub and Tree dominance in the Jack Springs Pinyon Research Natural Area. USDA, Forest Service Proceedings RMRS-P-00.
- Tausch, R. J., and Hood, S. 2007. Pinyon/juniper woodlands. Chap. 4. In: Fire Ecology and Management of the Major Ecosystems of Southern Utah. M. Miller and S. Hood (eds.). Rocky Mountain Research Station, Fort Collins, CO. General Technical Report. In Press.
- Taylor, R. L., D. E. Naugle, and L. S. Mills. 2012. Viability Analyses for Conservation of Sage-Grouse Populations: Buffalo Field Office, Wyoming Final Report. Prepared for Bureau of Land Management Buffalo Field Office, Buffalo, Wyoming. Wildlife Biology Program University of Montana BLM Contract 09-3225-0012 Number G09AC00013. February 27, 2012.
- Taylor, T. 2006. Rural Communities and Public Lands in the West: Impacts and Alternatives. University of Wyoming. USDA Research, Education and Economics Information System.
- Taylor and Tuttle. 2007. Water for Wildlife: A Handbook for Ranches and Range Managers.
- Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York, New York.
- Thompson, T. R. 2006. Dispersal ecology of greater sage grouse in northwestern Colorado: evidence from genetic and demographic data: 2006 Annual Progress Report. Colorado Division of Wildlife, Grand Junction, Colorado, USA.
- Thurow, T. L., and C. A. Taylor, Jr. 1999. Viewpoint: The role of drought in range management. *Journal of Range Management* 52:413-419.
- Tisdale, E. W. 1994. Great Basin region sagebrush types. In: T. N. Shiflet (editor), Rangeland Cover Types. *Soc. Range Manage.*, Denver, Colorado. Pp. 40-46.
- Tisdale, E. W., and M. Hironaka. 1981. The sagebrush-grass region: a review of the ecological literature. Idaho Forest, Wildlife, and Range Experiment Station, Bulletin 33, Moscow, Idaho.
- TMRPA (Truckee Meadows Regional Planning Agency). 2007. Regional Plan. July 19, 2007. Reno, NV.
- _____. 2010. Wider Region Stakeholders Profile Report: An Analysis of Neighboring Local Governments, Regional Organizations, Native American Tribes and Economic Development Organizations. Internet website: <http://tmrpa.org/uploads/misc/568683765-Regional%20Stakeholder%20Profile%20Report%20-%20Final%20Report%20for%20Web%20Publishing.pdf>.
- TNC (The Nature Conservancy). 2001. Great Basin: An Ecoregion-Based Conservation Blueprint. Reno, Nevada.
- The Science Analysis of the National Cohesive Wildland Fire Management Strategy. 2015. Internet Website: <http://cohesivefire.nemac.org/>. Accessed on March 16, 2015.

- Todres, T., A. Seidl, D. McLeod, A. Bittner, R. Coupal, and K. Inman. 2003. Preferred Public Land Use and Policy in Moffat County: Final Report of Countywide Opinion Survey. APRPR03-11. Agricultural and Resource Policy Report, Dept. of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO. Internet website: <http://dare.colostate.edu/pubs/ARPR/ARPR%2003-11.pdf>.
- Torregrosa, A., and N. Devoe. 2008. Urbanization and Changing Land Use in the Great Basin. USDA Forest Service General Technical Report RMRS-GTR-204.
- Torell, L. Allen, Neil R. Rimbey, Octavio A. Ramirez, and Daniel W. McCollum. 2005. Income earning potential versus consumptive amenities in determining ranchland values. *Journal of Agricultural and Resource Economics* 30(3):537-560.
- Torell, L. A, N. Rimbey, J. Tanaka, D. Taylor, J. Ritten, T. Foulke. 2014. Ranch-Level Economic Impacts of Altering Grazing Policies on Federal Land to Protect the Greater Sage-Grouse.
- Trimble, S. 1989. *The Sagebrush Ocean*. University of Nevada Press, Reno.
- Trombulak, S. C., and C. A. Frissel. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14:18-30.
- UDWR (Utah Department of Natural Resources, Division of Wildlife Resources). 2009. Utah Greater Sage-grouse Management Plan. Utah Department of Natural Resources, Division of Wildlife Resources, Publication 09-17, Salt Lake City, Utah, USA.
- University of Nevada at Reno. 2015. Map 162 and OF 11-2 Interactive Oil and Gas Potential Map for the Nevada Bureau of Mines and Geology. Internet website: http://gisweb.unr.edu/flexviewers/map_162_and_of11_2/.
- USAF (United States Air Force). 2012. F-35A Training Basing Environmental Impact Statement. Internet website: <http://www.f-35atrainingeis.com/>. pp. BO-78; Appendix B-41.
- US Census Bureau. 1990. 1990 Census of Population. Internet website: <http://www.census.gov/popest/data/intercensal/st-co/index.html>.
- _____. 2000. Census of Population. Internet website: <http://www.census.gov/popest/data/intercensal/st-co/index.html>.
- _____. 2009. Table 4. Cumulative Estimates of the Components of Resident Population Change for the United States, Regions, States, and Puerto Rico: April 1, 2000, to July 1, 2009. Internet website: http://www.census.gov/popest/data/historical/2000s/vintage_2009/index.html.
- _____. 2010a. 2010 Census of Population. Internet website: <http://2010.census.gov/2010census/data/>.
- _____. 2010b. Profile of General Population and Housing Characteristics: 2010.
- _____. 2010c. State and Local Government Finances by Level of Government and by State: 2009-10. State and Local Government Finances. Internet website: <http://www.census.gov/govs/estimate/>.

- _____. 2010d. American Community Survey, 5-Year Estimates, 2006-2010.
- _____. 2011. Selected Housing Characteristics. 2007-2011 American Community Survey 5-year Estimates. American Factfinder. Internet website: <http://factfinder2.census.gov>.
- _____. 2011b. 2011. Population Estimates, Intercensal Estimates of the Resident Population for Counties: April 1, 2000 to July 1, 2010. Internet website: <http://www.census.gov/popest/data/intercensal/county/CO-EST00INT-01.html>.
- _____. 2012a. Commuter patterns for counties in California and Nevada, generated from Census Bureau database OnTheMap. Internet website: <http://onthemap.ces.census.gov/>.
- _____. 2012b. How the Census Bureau Measures Poverty. Internet website: <http://www.census.gov/hhes/www/poverty/about/overview/measure.html>.
- US Court of Appeals, DC Circuit. 1989. *State of Ohio v. US Department of the Interior* (880 F.2d. 432).
- USDA (US Department of Agriculture). 2013. Water Supply Outlook for the Western United States, October 18, 2012. Internet website: <http://www.wcc.nrcs.usda.gov/wsf/westwide.html>.
- USDA and DOI (US Department of Agriculture and US Department of the Interior). 2001. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy. Washington, DC.
- USDA ERS (US Department of Agriculture Economic Research Service). 2012. Commodity Costs and Returns. Internet website: <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>. Accessed on August 2012.
- USDA NASS. 2014. Census of Agriculture 2012. Internet website: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/.
- USDA NRCS (Natural Resources Conservation Service). 1997. National Range and Pasture Handbook. Government Printing Office, Washington DC.
- _____. 2011. Lotic riparian complex ecological site descriptions. Guidelines for development. Third draft-June 2011. West National Technology Support Center, Portland, OR.
- _____. 2015. Western Snowpack and Water Supply Conditions. April 2015. Internet website: <http://www.wcc.nrcs.usda.gov/cgibin/westsnowsummary.pl>. Accessed on April 15, 2015.
- US Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System, Local Area Personal Income and Employment. Internet website: <http://www.bea.gov/regional/index.htm>.
- USDI (Department of the Interior). 2001. Biological Soil Crusts: Ecology and Management. Technical Reference 1730-2. United States Department of the Interior. P. 59.

- US Environmental Protection Agency. 2000. Guidelines for Preparing Economic Analyses. EPA 240-R-00-003. Washington, DC.
- _____. 2009. Valuing the Protection of Ecological Systems and Services. EPA-SAB-09-012. Washington, DC.
- _____. 2010. Guidelines for Preparing Economic Analyses. EPA 240-R-10-001. Washington, DC.
- USFWS (United States Fish and Wildlife Service). 1982. Aquatic Habitat Management Plan; North Fork, Little Humboldt River, Nevada.
- _____. 1986a. Pacific States Bald Eagle Recovery Plan. August 25, 1986.
- _____. 1986b. Ruby Lake National Wildlife Refuge Management Plan. 1986.
- _____. 1988. Ruby Lake National Wildlife Refuge Water Management Plan. 1988.
- _____. 1994. Big Spring Spinedace Recovery Plan. Portland, Oregon. January 20, 1994.
- _____. 1994b. 1994. Final Environmental Impact Statement: The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho. US Department of Agriculture, Washington, DC.
- _____. 1995. Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) Recovery Plan. Portland, Oregon.
- _____. 1997a. Railroad Valley Springfish Recovery Plan. Portland, Oregon. March 15, 1997.
- _____. 1997b. Recovery Plan for the Rare Species of Soldier Meadows. Portland, Oregon. May 27, 1997.
- _____. 1998a. Recovery Plan for the Aquatic and Riparian Species of Pahrangat Valley. Portland, Oregon.
- _____. 1998b. Recovery Plan for the Native Fishes of the Warner Basin and Alkali Subbasin. Portland, Oregon. April 27, 1998.
- _____. 1999. Draft Big Spring Spinedace Recovery Implementation Plan.
- _____. 2001a. Pahrangat National Wildlife Refuge Wildland Fire Management Plan. September 2001.
- _____. 2001b. Ruby Lake National Wildlife Refuge Fire Management Plan. September 2001.
- _____. 2002. Southwestern Willow Flycatcher Recovery Plan. Albuquerque, New Mexico. August 30, 2002.
- _____. 2003. Conservation Agreement and Conservation Strategy for Columbia Spotted Frog (*Rana luteiventris*) Toiyabe Great Basin Subpopulation. September 30, 2003.
- _____. 2007. Recovery Plan for the Carson Wandering Skipper. Sacramento, California. September 13, 2007.

-
- _____. 2009. Net Economic Values of Wildlife-Related Recreation in 2006. Report 2006-5. US Department of Agriculture, Washington, DC.
- _____. 2010a. Endangered and Threatened Wildlife and Plants; 12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. 75 *Federal Register* 13910. March 23, 2010.
- _____. 2010b. 12-Month Finding on a Petition to List the Pygmy Rabbit as Endangered or Threatened. 75 *Federal Register* 60516, September 30, 2010.
- _____. 2012. Sheldon National Wildlife Refuge Final Comprehensive Conservation Plan. Lakeview, Oregon. September 27, 2012.
- _____. 2012b. Alton Coal Track Lease By Application Draft Environmental Impact Statement DES-11-51 (Comment Letter). Utah Field Supervisor, Ecological Services, US Fish and Wildlife Service, West Valley City, Utah. January 27, 2012.
- _____. 2013a. Greater Sage-Grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. US Fish and Wildlife Service, Conservation Objectives Team, Denver, Colorado. February 2013.
- _____. 2013b. Greater Sage-Grouse Programmatic Candidate Conservation Agreement for Rangeland Management Practices on Bureau of Land Management Lands in Oregon. Agreement Number BLM-OR932-1235. Developed cooperatively by the: Oregon Cattlemen's Association, BLM, and USFWS. May 30, 2013.
- _____. 2013c. Draft Environmental Assessment for A Greater Sage-Grouse Programmatic Candidate Conservation Agreement with Assurances for Private Rangelands in Harney County, Oregon. Prepared by USFWS. December 13, 2013. 38 pp.
- _____. 2013d. National Wetlands Inventory Database. Internet website: <http://www.fws.gov/wetlands/Data/>. Accessed in May 2013.
- _____. 2014. Memorandum: Greater Sage-Grouse: Additional Recommendations to Refine Land Use Allocations in Highly Important Landscapes. October 27, 2014.
- USFWS and NOAA (National Oceanic and Atmospheric Administration). 2003. Policy for Evaluation of Conservation Efforts When Making Listing Decisions. 68 *Federal Register* 15100. March 28, 2003.
- USGS (United States Geological Survey) 2004. National GAP Analysis Program. 2004. Provisional Digital land cover map for the southwestern United States. Version 1.0. Logan: Utah State University, College of Natural Resources, RS/GIS Laboratory. Internet website: <http://earth.gis.usu.edu/swgap/landcover.html>.
- USGS (United States Geological Survey). 2006a. The National Map. LANDFIRE: LANDFIRE Rapid Assessment Fire Regimes layer. (2006, September – last update). US Department of the Interior, Geological Survey. Internet website: <http://gisdata.usgs.net/website/landfire/> [2013, May 3].—PG 40.

- _____. 2006b. LANDFIRE: LANDFIRE Rapid Assessment Vegetation Condition Class layer. Last updated September 2006. US Department of the Interior, Geological Survey. Internet website: <http://gisdata.usgs.net/website/landfire/>.
- _____. 2006c. Effects of Fire in the Northern Great Plains; Effects of Fire on Some Undesirable Species. Internet website: <http://www.npwrc.usgs.gov/resource/habitat/fire/undesire.htm>. Accessed on January 29, 2013. P. 143.
- _____. In prep. Winter food habits of greater sage-grouse in northeastern NV.
- _____. 2014. Coates, P. S., M. L. Casazza, B. E. Brussee, M. A. Ricca, K. B. Gustafson, C. T. Overton Sanchez-Chopitea, et al. 2014. Spatially explicit modeling of greater sage-grouse (*Centrocercus urophasianus*) habitat in Nevada and northeastern California—A decision-support tool for management. US Geological Survey Open-File Report 2014-1163. Internet website: <http://dx.doi.org/10.3133/ofr20141163>.
- _____. 2014. Sage-grouse Local Working Group Locator. Internet website: <http://greatbasin.wr.usgs.gov/LWG/>. Accessed on May 15, 2015.
- US Water Resources Council. 1983. Principles and Guidelines for Water and Related Land Resource Implementation Studies. Washington, DC.
- Utah Greater Sage-Grouse Working Group. 2013. Conservation Plan for Greater Sage-Grouse in Utah. February 14, 2013.
- Vance, L. K., and D. Stagliano. 2007. Watershed Assessment of Portions of the Lower Musselshell and Fort Peck Reservoir Sub-Basins. Report to the Bureau of Land Management, Billings, Montana. Montana Natural Heritage Program, Helena.
- Van Poolen, H. W., and J. R. Lacey. 1979. Herbage response to grazing systems and stocking intensities. *Journal of Range Management* v. 32, p. 250–253.
- Vavra, M., W. A. Laycock, and R. Pieper (editors). 1994. Ecological implications of livestock herbivory in the west. *Society of Range Management*. Denver, Colorado.
- Wagner, F. 1983. Status of Wild Horse and Burro Management on Public Rangelands. *Transactions of the North American Wildlife and Natural Resources Conference* 48:116-133.
- Wakkinen, W. L., K. P. Reese, and J. W. Connelly. 1992. Sage grouse nest locations in relation to leks. *Journal of Wildlife Management* 56:381-383.
- Walker, Jr., and E. Deward. 2010. Ethnographic Assessment of the Ruby Pipeline Right-of Way (RPROW). Report on file with the BLM Winnemucca District Office, Nevada.
- Walker, R. H., and G. A. Buchanan. 1982. Crop manipulation in integrated weed management systems. *Weed Sci.* 30:17-24.

- Walker, B. L., D. E. Naugle, and K. E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. *Journal of Wildlife Management* 71:2644-54.
- Walker B. L., and D. E. Naugle. 2011. West Nile virus ecology in sagebrush habitat and impacts on greater sage-grouse populations. In: S. T. Knick and J. W. Connelly (editors), Greater sage-grouse: ecology and conservation of a landscape species and its habitats. *Studies in Avian Biology* No. 38:127-144.
- Wallstad, R. O., and D. Pyrah. 1974. Movement and nesting of sage grouse hens in central Montana.
- Walter, M. J. and J. Hope. 2003. A comparison of 3 aerial survey techniques to estimate wild horse abundance in the Austrian Alps. *Wildlife Society Bulletin* 31: 1138-1149.
- Washoe County (Nevada). 2005a. Comprehensive Plan. June 21, 2005.
- _____. 2005b. Water Resources Management Plan, Nevada. January 18, 2005.
- _____. 2008. Open Space and Natural Resource Management Plan. January 2008.
- Wasser, S. K., K. E. Hunt, J. L. Brown, K. Cooper, C. M. Crockett, U. Bechert, J. J. Millspaugh, et al. 2000. A generalized fecal glucocorticoid assay for use in a diverse array of nondomestic mammalian and avian species. *General and Comparative Endocrinology* 120:260–275.
- Watters, M. E., T. L. McLash, C. L. Aldridge, and R. M. Brigham. 2002. The effect of vegetation structure on the fate of artificial Greater Sage-Grouse nests. *Ecoscience* 9:314-319.
- WECC (Western Electricity Coordinating Council). 2012. Capital Costs for Transmission and Substations. Recommendations for WECC Transmission Expansion Planning. Internet website: http://www.wecc.biz/committees/BOD/TEPPC/External/BV_WECC_TransCostReport_Final.pdf. Accessed on June 04, 2014.
- _____. 2012. Capital Costs for Transmission and Substations. Recommendations for WECC Transmission Expansion Planning. Internet website: http://www.wecc.biz/committees/BOD/TEPPC/External/BV_WECC_TransCostReport_Final.pdf. Accessed on June 04, 2014.
- Weiss, N. T., and B. J. Verts. 1984. Habitat and distribution of pygmy rabbits (*Sylvilagus idahoensis*) in Oregon. *Great Basin Naturalist* 44:563-571.
- Weixelman, D. A., D. C. Zamudio, K. A. Zamudio, and R. J. Taush. 1997. Classifying ecological types and degradation. *Journal of Range Management* 50: 315-321.
- Welch, B. L., F. J. Wagstaff, and R. L. Williams. 1990. Sage grouse status and recovery plan for Strawberry Valley, Utah. US Forest Service Research Paper. INT-RP-430.
- Welch, A. H., D. J. Bright, and L. A. Knochenmus (editors). 2007. Water Resources of the Basin and Range Carbonate-Rock Aquifer System, White Pine County, Nevada, and the Adjacent Areas in Nevada and Utah. US Geological Survey Scientific Investigations Report 2007-5261.

- Westerling, A. L., H. G. Hidalgo, D. R. Cayan, and T. W. Swetnam. 2006. Warming and earlier spring increase Western US forest wildfire activity. *Science*, Vol. 313:940-943.
- Western Area Power Administration (WAPA). 2013. Upper Great Plains Wind Energy programmatic Environmental impact Statement (Draft). DOE/EIS-0408. March 2013.
- West, N. E. 1984. Successional patterns and productivity potentials of pinyon-juniper ecosystems. *In: Developing strategies for rangeland management. Nat. Res. Council/National Acad. of Science.* Westview Press, Boulder, Colorado. BLM Library Request. Pp. 1301-1332.
- _____. 1988. Intermountain deserts, shrub steppes and woodlands. *In: M. G. Barbour and W. D. Billings (editors), North American Terrestrial Vegetation.* Cambridge University Press, Cambridge, UK. Pp. 209-230.
- _____. 1999. Managing for biodiversity of rangelands. *In: W. W. Collins and C. O. Qualset (editor). Biodiversity in Agro-Ecosystems.* CRC Press, Boca Raton, Florida. Pp. 101-126.
- West, N. E., and T. P. Yorks. 2002. Vegetation responses following wildfire on grazed and ungrazed sagebrush semi-desert. *Journal of Range Management* 55:171–181.
- West, N. E., and J. A. Young. 2000. Intermountain valleys and lower mountain slopes, in Barbour, M.G., and Billings, eds., *North American terrestrial vegetation* (2nd ed.). New York, Cambridge University Press. Pp. 256–284. *Wildl. Manage.* 38: 630-633.
- WGFD (Wyoming Game and Fish Department). 2011. Wyoming Game and Fish Department Protocols for Treating Sagebrush to Benefit Sage-Grouse. Unpublished report.
- Whisenant, Steven G. 1990. Changing fire frequencies on Idaho's Snake River Plains: Ecological and management implications. *In: E. Durant McArthur, Evan M. Romney, Stanley D. Smith, and Paul T. Tueller (compilers). Proceedings—Symposium on cheatgrass invasion, shrub die-off, and other aspects of shrub biology and management.* Las Vegas, Nevada. Gen. Tech. Rep. INT-276. Ogden, Utah. US Department of Agriculture, Forest Service, Intermountain Research Station. 4-10. April 5-7, 1989.
- White, Eric M., and Darren Gooding. 2012. Estimation of National Forest Visitor Spending Averages from National Visitor Use Monitoring Round 2. Gen. Tech. Rep. PNW-GTR-XXX. US Department of Agriculture, Forest Service. Pacific Northwest Research Station, Portland, Oregon.
- White Horse Associates. 2011. Maggie Creek Watershed Restoration Project. Remote Sensing Monitoring. Report prepared for the Elko District, Bureau of Land Management, Elko, NV.
- White Pine County. 2006. Water Resources Plan. August 2006.
- _____. 2007. Public Lands Policy Plan. May 2007.
- _____. 2009. Comprehensive Master Plan. January 2009.

- Wiens, J. A., and J. T. Rotenberry. 1981. Habitat associations and community structure of birds in shrubsteppe environments. *Ecological Monographs* 51:21–42. Internet website: <http://dx.doi.org/10.2307/2937305>.
- Wiens, J. A., J. T. Rotenberry, and B. Van Horne. 1986. A lesson in the limitations of field experiments: shrubsteppe birds and habitat alteration. *Ecology* 67:365-376.
- Wilcox B. P., M. S. Seyfried, D. D. Breshears, and J. J. McDonnell. 2012. Ecohydrologic connections and complexities in drylands: new perspectives for understanding transformative landscape change. *Ecohydrology* 5:143-144. DOI: 10.1002/eco.1251.
- Wildland Fire Management Information (WFIM). 2015. US Department of the Interior, Bureau of Land Management National Interagency Fire Center. 2015. Internet website: <https://www.nifc.blm.gov/cgi/WfmiHome.cgi>.
- Williams, J. E., C. W. Wood, and M. P. Dombeck (editors). 1997. Watershed restoration: principles and practices. *American Fisheries Society*. Bethesda, Maryland.
- Williams, Colin F., Marshall J. Reed, Robert H. Mariner, Jacob DeAngelo, and Peter S. Galanis, Jr. 2008. Assessment of moderate- and high-temperature geothermal resources of the United States. US Geological Survey Fact Sheet 2008-3082.
- Williams, B., R. Szaro, and C. Shapiro. 2009. Adaptive Management: The US Department of the Interior Technical Guide. Washington, DC: Department of the Interior, Adaptive Management Working Group.
- Williams, M. I., G. B. Paige, T. L. Thurow, A. L. Hild, and K. G. Gerow. 2011. Songbird relationships to shrub-steppe ecological site characteristics. *Rangeland Ecology & Management* 64:109-118.
- Wilson, M., and J. Hoehn. 2006. Valuing Environmental Goods and Services Using Benefit Transfer: The State-of-the-art and Science. *Ecological Economics*. Special Issue Volume 60.
- Wingfield, J. C. 2005. The concept of allostasis: coping with a capricious environment. *Journal of Mammalogy* 86:248–254.
- Winward, A. H. 1991. Management in the Sagebrush Steppe. Agricultural Experiment Statistics. Oregon State University Special Report 880, Corvallis.
- Wisdom, M. J., C. W. Meinke, S. T. Knick, and M. A. Schroeder. 2011. Factors associated with extirpation of sage-grouse. In: S. T. Knick and J. W. Connelly (editors). Greater sage-grouse: ecology and conservation of a landscape species and its habitats. *Studies in Avian Biology* 38:451-472. University of California Press, Berkeley.
- Wolfe, M. L. 1980. Feral horse demography: A preliminary report. *Journal of Range Management* 33 (5):354-360.
- Wolfe, M. L., L. C. Ellis, and R. MacMullen. 1989. Reproductive rates of feral horses and burros. *Journal of Wildlife Management* 53 (4):916-919.

- Workman, J. P. 1986. *Range Economics*. Macmillan, New York, New York.
- WRCC (Western Regional Climate Center). 2013. Climate of Nevada. Internet website: <http://www.wrcc.dri.edu/narratives/nevada/>. Accessed on April 27, 2013.
- Wyman, S., et al. 2006. Riparian area management: grazing management processes and strategies for riparian-wetland areas. Technical Reference 1737-20. BLM/ST/ST-06/002+1737. US Department of the Interior, Bureau of Land Management, National Science and Technology Center. Denver, Colorado.
- Yoder, J. M., D. A. Swanson, and E. A. Marschall. 2004. The cost of dispersal: Predation as a function of movement in ruffed grouse. *Behavioral Ecology* 15:469-476.
- Young, J. A., and R. Evans. 1989. Dispersal and germination of sagebrush (*Artemisia tridentata*) seeds. *Weed Science* 37:201-206. Weed Science Society of America, Lawrence, Kansas.
- Young, J. A., and B. A. Sparks. 2002. *Cattle in the Cold Desert*. Expanded edition. University of Nevada Press, Reno.
- Young, J. A., and R. A. Evans. 1978. Population dynamics after wildfires in sagebrush grasslands. *Journal of Range Management* 31:283–289. Young, B. E., K. R. Hall, E. Byers, K. Gravuer, G. Hammerson, A. Redder, and K. Szabo. 2011. A natural history approach to rapid assessment of plant and animal vulnerability to climate change. In: J. Brodie, E. Post, and D. Doak (editors). *Conserving Wildlife Populations in a Changing Climate*. University of Chicago Press, Chicago, Illinois.
- Zehner, R., M. Coolbaugh, L. Shevenell. 2009. Preliminary geothermal potential and exploration activity in Nevada: Nevada Bureau of Mines and Geology Open-File Report 09-1.
- Ziska, L. H., J. B. Reeves, III, and B. Blank. 2005. The impact of recent increases in atmospheric CO₂ on biomass production and vegetative retention of cheatgrass (*Bromus tectorum*): implications for fire disturbance. *Global Change Biology* 11: 1325-1332.
- Zou, L., S. N. Miller, and E. T. Schmidtman. 2006. Mosquito larval habitat mapping using remote sensing and GIS: implications of coalbed methane development and West Nile virus. *Journal of Medical Entomology* 43:1034-1041.

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Chapter 8

Acronyms and Glossary

CHAPTER 8

ACRONYMS AND GLOSSARY

8.1 ACRONYMS

ADH	All designated habitat
ACEC	Area of Critical Environmental Concern
AML	Appropriate management level
AMP	Allotment Management Plan
AMS	Analysis of the management situation
AOI	Annual Operating Instructions
APD	Application for permit to drill
AQI	Air quality index
AQRV	Air quality related values
ATV	All-terrain vehicle
AUM	Animal unit month
BAPC	Bureau of Air Pollution Control
BAQP	Bureau of Air Quality Planning
BLM	United States Department of the Interior, Bureau of Land Management
BLM S	BLM Sensitive
BMP	Best management practice
BSU	Biologically Significant Unit
°C	Degrees Celsius
C	Custodial management category
CA	California
CAA	Clean Air Act
CARB	California Air Resources Board
CBR	Central Basin and Range
CCC	Cooperation Communication and Consultation
CCDAQ	Clark County, Health District, Air Pollution Control Division
CCS	Conservation Credit System
CDFW	California Department of Fish and Wildlife
CEC	Commission for Environmental Cooperation
CEQ	Council on Environmental Quality
CFL	Cycle first listed
CFR	Code of Federal Regulations

cm	Centimeter
CO	Carbon monoxide
CO _{2e}	Carbon dioxide gross emissions
COA	Conditions of Approval
COT	Conservation Objectives Team
CSU	Controlled surface use
CTTM	Comprehensive travel and transportation management
CWA	Clean Water Act
CWMA	Cooperative Weed Management Area
dB	Decibel
dBA	Decibel-a-weighted
dBC	Decibel-c-weighted
dBF	Decibel-unweighted
DFC	Desired future condition
DM	Departmental Manual
DMP	Disturbance management protocol
DOD	Department of Defense
DOE	Department of Energy
DOI	United States Department of the Interior
EA	Environmental assessment
EDRR	Early Detection, Rapid Response
EIS	Environmental impact statement
EPA	United States Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ERS	United States Department of Agriculture Economic Resource Service
ESA	Endangered Species Act
ESD	Ecological Site Description
ESR	Emergency stabilization and rehabilitation
°F	Degrees Fahrenheit
FARD	Functional at risk with downward trend
FARN	Functional at risk with no trend
FARU	Functional at risk with upward trend
FC	Federal listed as a candidate species
FC (w)	Federal candidate species warranted for listing
FE	Federally listed as endangered
FERC	Federal Energy Regulatory Commission
FIAT	Wildfire and Invasive Annual Grasses Assessment Team
FLPMA	Federal Land Policy and Management Act
FMP	Fire Management Plan
FMU	Fire Management Unit
Forest Service	United States Department of Agriculture, Forest Service
FRCC	Fire Regime Condition Class
FSH	Forest Service Handbook
FSM	Forest Service Manual
FT	Federally listed as threatened
FWFMP	Federal Wildland Fire Management Policy
FY	Fiscal year
GBBO	Great Basin Bird Observatory
GDP	Geothermal drilling permit
GHG	Greenhouse gas

GHMA	General habitat management area
GIS	Geographic Information Systems
GRSG	Greater Sage-Grouse
H ₂ S	Hydrogen sulfide
HA	Herd area
HFRA	Healthy Forests Restoration Act
HGWP	High global warming potential
HMA	Herd management area
HIS	Habitat suitability index
I	Improve management category
IM	Instructional Memorandum
IMP	Interim Management Plan
IMPLAN	Impact analysis for Planning
IPCC	Intergovernmental Panel on Climate Change
IMTs	Incident Management Team
JEDI	National Renewable Energy Laboratory's Jobs and Economic Development Impact model
kWh/m ² /day	Kilowatt hours per square meter per day
LANDFIRE	Landscape Fire and Resource Management Planning Tools Project
LCAPCD	Lassen County Air Pollution Control District
LRMP	Land and resource management plan
LUA	Land use authorization
LUP	Land use plan
LUPA	Land use plan amendment
LWCs	Lands with Wilderness Characteristics
M	Maintain improvement category
MAFFS	Modular Airborne Firefighting System
MIS	Management Indicator Species
MCF	Thousand cubic feet
µg/m ³	Micrograms per cubic meter
MCAPCD	Modoc County Air Pollution Control District
MDEQ	Montana Department of Environmental Quality
MDFWP	Montana Department of Fish, Wildlife and Parks
MFP	Monitoring Framework Plan
MOU	Memorandum of understanding
MTNHP	Montana Natural Heritage Program
MW	Megawatt
MZ	Management zone
NAAQS	National Ambient Air Quality Standards
NBR	Northern Basin and Range
NCA	National Conservation Area
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFMA	National Forest Management Act
NGB	Northern Great Basin
NHT	National historic trail
NMV	Non-market value
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides

NPS	National Park Service
NRCS	Natural Resources Conservation Service
NSO	No surface occupancy
NTT	Sage-Grouse National Technical Team
NV	Nevada
NVUM	National Visitor Use Monitoring
NWAP	Nevada Wildlife Action Plan
O ₃	Ozone
OHMA	Other Habitat Management Area
OHV	Off-highway vehicle
ONA	Outstanding natural area
ONRR	Office of Natural Resource Revenue
ORV	Outstanding remarkable values
PACs	Priority areas for conservation
Pb	Lead
PEIS	Programmatic Environmental Impact Statement
PFC	Proper functioning condition
PGH	Preliminary general habitat
PGMA	Preliminary general management area
PHMA	Priority habitat management area
PILT	Payment in lieu of taxes
PLO	Public Land Order
PM _{2.5}	Particulate matter with a diameter less than or equal to 2.5 microns
PM ₁₀	Particulate matter with a diameter less than or equal to 10 microns
PMA-3	Nevada Sagebrush Ecosystem Mitigation Bank Program
PMU	Population Management Units
ppb	Parts per billion
PPH	Preliminary priority habitat
ppm	Parts per million
PPMA	Preliminary priority management area
RAC	Resource Advisory Council
RDFs	Required design features
REA	Rapid Ecoregional Assessment
RFDS	Reasonable Foreseeable Development Scenario
RMIS	Recreation Management Information System
RMP	Resource management plan
RNA	Research natural area
ROD	Record of decision
ROS	Recreation Opportunity Spectrum
ROW	Right-of-way (includes leases and permits)
RSUA	Recreation Special Use Authorization
S&G	Standards and guidelines
SC	State listed as species of special concern (no legal status)
SE	State listed as endangered
SETT	Sagebrush Ecosystem Technical Team
SFA	Sagebrush focal area
SGMA	Sage-grouse management area (Nevada State Alternative)
SLM	Sound level meter
SNPLMA	Southern Nevada Public Land Management Act
SO ₂	Sulfur dioxide

SO ₄ ²⁻	Sulfates
SOP	Standard operating procedure
SUA	Special Use Authorization
SUI	Space use index
SUP	Special Use Permit
SRMA	Special Recreation Management Area
SRP	Special Recreation Permit
SRU	Special recreational use
ST	State listed as threatened
SUA	Special Use Authorization
TL	Timing limitation
TMA	Travel Management Area
TNC	The Nature Conservancy
TNR	Temporary nonrenewable
TTM	Travel and Transportation Management
US	United States
USAF	US Air Force
USC	United States Code
USDA	United States Department of Agriculture
USDA-APHIS	United States Department of Agriculture- Animal and Plant Health Inspection Service
USDI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USG	Unhealthy for Sensitive Groups
USGS	US Geological Survey
VDDT	Vegetation Dynamics Development Tool
VMS	Visual Management System
VOC	Volatile organic compounds
VRI	Visual resource inventory
VRM	Visual resource management
WAFWA	Western Association of Fish and Wildlife Agencies
WCAQMD	Washoe County Air Quality Management Division
WEG	Wild Earth Guardians
WHBT	Wild horse and burro territories
WO	Washington Office
WSA	Wilderness Study Area
WSR	Wild and Scenic River
WUI	Wildland urban interface
WWEC	West-Wide Energy Corridor
WWP	Western Watershed Project

8.2 GLOSSARY

2008 WAFWA Sage-Grouse MOU. A memorandum of understanding (MOU) among Western Association of Fish and Wildlife Agencies (WAFWA); US Department of Agriculture, Forest Service; US Department of the Interior, Bureau of Land Management (BLM); US Department of the Interior, Fish and Wildlife Service (USFWS); US Department of the Interior, Geological Survey (USGS); US Department of Agriculture, Natural Resources Conservation Service (NRCS); and the US Department of Agriculture, Farm Service Agency. The purpose of the MOU is to provide for cooperation among the participating state and federal land, wildlife management and science agencies in the conservation and management of sage-grouse (*Centrocercus urophasianus*) sagebrush (*Artemisia* spp.) habitats and other sagebrush-dependent wildlife throughout the western US and Canada and a commitment of all agencies to implement the 2006 WAFWA Conservation Strategy.

2011 Partnership MOU. A partnership agreement among the United States Department of Agriculture, Natural Resources Conservation Service, Forest Service, United States Department of the Interior, Bureau of Land Management, and USFWS in 2011. This MOU is for range management to implement Natural Resources Conservation Service practices on adjacent federal properties.

Acquisition. Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, Land and Water Conservation Fund purchases, donations, or receipts from the Federal Land Transaction Facilitation Act sales or exchanges.

Activity plan. A type of implementation plan (see *Implementation plan*); an activity plan usually describes multiple projects and applies best management practices to meet land use plan objectives. Examples of activity plans include interdisciplinary management plans, habitat management plans, recreation area management plans, and grazing plans.

Actual use. The amount of animal unit months consumed by livestock based on the numbers of livestock and grazing dates submitted by the livestock operator and confirmed by periodic field checks by the BLM.

Adaptive management. A type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices.

Additionality. The conservation benefits of compensatory mitigation are demonstrably new and would not have resulted without the compensatory mitigation project (BLM Manual Section 1794).

Administrative access. A term used to describe access for resource management and administrative purposes such as fire suppression, cadastral surveys, permit compliance, law

enforcement and military in the performance of their official duty, or other access needed to manage BLM-administered or National Forest System lands or uses.

Air basin. A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined along political boundary lines and include both the source and receptor areas.

Air pollution. Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air.

Allotment. An area of land in which one or more livestock operators graze their livestock. Allotments generally consist of BLM-administered lands or National Forest System lands but may include other federally managed, state-owned, or private lands. An allotment may include or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Allotment management plan. A concisely written program of livestock grazing management, including supportive measures if required, designed to attain specific, multiple-use management goals in a grazing allotment. An AMP is prepared in consultation with the permittee(s), lessee(s), and other affected interests. Livestock grazing is considered in relation to other uses of the range and to renewable resources, such as watershed, vegetation, and wildlife. An AMP establishes seasons of use, the number of livestock to be permitted, the range improvements needed, and the grazing system.

Alluvial soil. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

Alluvium. Clay, silt, sand, gravel, or other rock materials transported by moving water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in rivers, floodplains, lakes, and shores, and in fans at the base of mountain slopes.

Ambient air quality. The state of the atmosphere at ground level as defined by the range of measured and/or predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

Amendment. The process for considering or making changes in the terms, conditions, and decisions of approved Resource Management Plans or management framework plans. Usually only one or two issues are considered that involve only a portion of the planning area.

Animal unit month (AUM). The amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month.

Anthropogenic disturbances. Human-created features that include but are not limited to paved highways, graded gravel roads, transmission lines, substations, wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines, landfills, agricultural conversion, homes, and mines.

Aquatic. Living or growing in or on the water.

Area of Critical Environmental Concern (ACEC). Special Area designation established through the BLM's land use planning process (43 CFR 1610.7-2) where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The level of allowable use within an ACEC is established through the collaborative planning process. Designation of an ACEC allows for resource use limitations in order to protect identified resources or values.

Arid (shrub condition). Sites with mean annual precipitation of less than 10 inches (25.4 centimeters).

Atmospheric deposition. Air pollution produced when acid chemicals are incorporated into rain, snow, fog, or mist and fall to the earth. Sometimes referred to as "acid rain" and comes from sulfur oxides and nitrogen oxides, products of burning coal and other fuels and from certain industrial processes. If the acid chemicals in the air are blown into the area where the weather is wet, the acids can fall to earth in the rain, snow, fog, or mist. In areas where the weather is dry, the acid chemicals may become incorporated into dust or smoke.

Attainment area. A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

Authorized /authorized use. This is an activity (i.e., resource use) occurring on the public lands that is both explicitly or implicitly recognized and legalized by law or regulation. This term may refer to those activities occurring on the public lands for which the BLM, Forest Service, or other appropriate authority (e.g., Congress for RS 2477 rights-of-way, FERC for major, and interstate rights-of-way), has issued a formal authorization document (e.g., livestock grazing lease/permit, right-of-way grant, coal lease, and oil and gas permit to drill). Formally authorized uses typically involve some type of commercial activity, facility placement, or event. These formally authorized uses are often spatially or temporally limited. Unless constrained or bounded by statute, regulation, or an approved land use plan decision, legal activities involving public enjoyment and use of the public lands (e.g., hiking, camping, and hunting) require no formal BLM or Forest Service authorization.

Avoidance/avoidance area. These terms usually address mitigation of some activity (i.e., resource use). Paraphrasing the CEQ Regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts of an action. Therefore, the term "avoidance" does not necessarily prohibit a proposed activity, but it may require the relocation of an action, or the total redesign of an action to eliminate any potential impacts resulting from it. Also see "*right-of-way avoidance area*" definition.

Avoidance mitigation. Avoiding the impact altogether by not taking a certain action or parts of an action (40 CFR 1508.20(a); e.g., avoiding the impact by moving the proposed action to a different time or location).

Baseline. The pre-existing condition of a defined area and/or resource that can be quantified by an appropriate metric(s). During environmental reviews, the baseline is considered the affected

environment that exists at the time of the review's initiation, and is used to compare predictions of the effects of the proposed action or a reasonable range of alternatives.

Best Management Practices (BMPs). A suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Big game. Indigenous, ungulate (hoofed) wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn antelope.

Biodiversity (biological diversity). The variety of life and its processes, and the interrelationships within and among various levels of ecological organization. Conservation, protection, and restoration of biological species and genetic diversity are needed to sustain the health of existing biological systems. Federal resource management agencies must examine the implications of management actions and development decisions on regional and local biodiversity.

Biological diversity (Forest Service). The number and distribution of plant and animal species within a specified geographic area. For purpose of the National Forest Management Act, the geographic area is a national forest or grassland unit.

Biological soil crust. A complex association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes that live within or atop the uppermost millimeters of soil.

Biologically Significant Unit. Delineation of GRSG habitat based on GRSG interactions between Population Management Units (PMU) to represent local GRSG population habitat and use areas within the sub-region.

BLM Sensitive Species. Those species that are not federally listed as endangered, threatened, or proposed under the Endangered Species Act, but that are designated by the BLM State Director under 16 USC 1536(a)(2) for special management consideration. By national policy, federally listed candidate species are automatically included as sensitive species. Sensitive species are managed so they will not need to be listed as proposed, threatened, or endangered under the Endangered Species Act.

Breeding habitat. Leks and the sagebrush habitat surrounding leks that are collectively used for pre-laying, breeding, nesting, and early brood-rearing, from approximately March through June (Connelly et al. 2004).

Candidate species. Taxa for which the USFWS has sufficient information on their status and threats to propose the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the Federal Register (BLM Manual 6840, Special Status Species Manual).

Casual Use. Casual use means activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements. For examples for rights of ways see 43 CFR 2801.5. For examples for locatable minerals see 43 CFR 3809.5.

Categorical exclusion. A category of actions (identified in agency guidance) that do not individually or cumulatively have a significant effect on the human environment, and for which neither an environmental assessment nor an environmental impact statement is required (40 CFR 1508.4), but a limited form of NEPA analysis is performed.

Checkerboard. This term refers to a land ownership pattern of alternating sections of federally owned lands with private- or state-owned lands for 20 miles on either side of a land grant railroad (e.g., Union Pacific, Northern Pacific). On land status maps this alternating ownership is either delineated by color coding or alphabetic code resulting in a “checkerboard” visual pattern.

Chemical vegetation treatment. Application of herbicides to control invasive species/noxious weeds and/or unwanted vegetation. To meet resource objectives the preponderance of chemical treatments would be used in areas where cheatgrass or noxious weeds have invaded sagebrush steppe.

Clean Air Act of 1963 (as amended). Federal legislation governing air pollution control.

Clean Water Act of 1972 (as amended). Federal legislation governing water pollution control.

Climate change. Any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- natural factors, such as changes in the sun’s intensity or slow changes in the Earth’s orbit around the sun;
- natural processes within the climate system (e.g., changes in ocean circulation); and
- human activities that change the atmosphere’s composition (e.g., driving automobiles) and the land surface (e.g., deforestation, reforestation, urbanization, and desertification).

Closed area. An area where off-road vehicle (i.e., OHV) use is prohibited. Use of off-road vehicles in closed areas may be allowed for certain reasons; however, such use shall be made only with the approval of the authorized officer (43 CFR 8340.0-5 (h)).

Collaboration. A cooperative process in which interested parties, often with widely varied interests, work together to seek solutions with broad support for managing public and other lands. Collaboration may take place with any interested parties, whether or not they are a cooperating agency.

Communication site. Sites that include broadcast types of uses (e.g., television, AM/FM radio, cable television, and broadcast translator) and non-broadcast uses (e.g., commercial or private mobile radio service, cellular telephone, microwave, local exchange network, and passive reflector).

Communications site corridor. A collection of communications sites or facilities along a route that provides continuous radio coverage along the route and that is usually associated with cellular wireless technology (FSH 2709.11-Communication Site Management, 90.5-Definitions).

Compensatory mitigation. Compensating for the (residual) impact by replacing or providing substitute resources or environments (40 CFR 1508.20).

Compensatory mitigation projects. Specific, on-the-ground actions to improve and/or protect habitats (e.g., chemical vegetation treatments, land acquisitions, and conservation easements).

Compensatory mitigation sites. The durable areas where compensatory mitigation projects will occur.

Comprehensive trails and travel management. The proactive interdisciplinary planning; on-the-ground management and administration of travel networks (both motorized and non-motorized) to ensure public access, natural resources, and regulatory needs are considered. It consists of inventory, planning, designation, implementation, education, enforcement, monitoring, easement acquisition, mapping and signing, and other measures necessary to provide access to public lands for a wide variety of uses (including uses for recreational, traditional, casual, agricultural, commercial, educational, landing strips, and other purposes).

Condition class (fire regimes). Fire regime condition classes are a measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities.

Conditions of Approval. Additional requirements associated with an approved Application for Permit to Drill for a federal leasable mineral to ensure environmental protection, safety, and/or conservation of the mineral resource.

Conformance. A proposed action shall be specifically provided for in the land use plan or, if not specifically mentioned, shall be clearly consistent with the goals, objectives, or standards of the approved land use plan.

Conservation measures. Measures to conserve, enhance, and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat.

Conservation plan. The recorded decisions of a landowner or operator, cooperating with a conservation district, on how the landowner or operator plans, within practical limits, to use his/her land according to its capability and to treat it according to its needs for maintenance or improvement of the soil, water, animal, plant, and air resources.

Conservation strategy. A strategy outlining current activities or threats that are contributing to the decline of a species, along with the actions or strategies needed to reverse or eliminate such a decline or threats. Conservation strategies are generally developed for species of plants and animals that are designated as BLM sensitive species or that have been determined by the USFWS or National Oceanographic and Atmospheric Administration-Fisheries to be federal candidates under the ESA.

Controlled surface use (CSU) (BLM and Forest Service). CSU is a category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values and is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, and construction of wells and/or pads).

Controlled surface use (BLM). CSU areas are open to fluid mineral leasing but the stipulation allows the BLM to require special operational constraints, or the activity can be shifted more than 200 meters (656 feet) to protect the specified resource or value.

Cooperating agency. Assists the lead federal agency in developing an environmental assessment or environmental impact statement. These can be any agency with jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any tribe or Federal, State, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Compensatory mitigation. Compensating for the (residual) impact by replacing or providing substitute resources or environments (40 CFR 1508.20).

Compensatory mitigation projects. Specific, on-the-ground actions to improve and/or protect habitats (e.g., chemical vegetation treatments, land acquisitions, and conservation easements).

Compensatory mitigation sites. The durable areas where compensatory mitigation projects will occur.

Council on Environmental Quality. An advisory council to the President of the US established by the National Environmental Policy Act of 1969. It reviews federal programs to analyze and interpret environmental trends and information.

Criteria pollutant. The US EPA uses six “criteria pollutants” as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards. The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead.

Cultural resources. Locations of human activity, occupation, or use. Cultural resources include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to specified social and/or cultural groups.

Cumulative effects. The direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action.

Decibel. A unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

Decision area. Public lands and mineral estate within the planning area that are encompassed by GRSG designated habitat which includes preliminary priority habitat (PPH/PHMA), preliminary general habitat (PGH/GHMA), and OHMA.

Deferred/deferred use. To set-aside, or postpone, a particular resource use(s) or activity(ies) on the public lands to a later time. Generally when this term is used the period of the deferral is specified. Deferrals sometimes follow the sequence timeframe of associated serial actions (e.g., action B will be deferred until action A is completed).

Degraded vegetation. Areas where the plant community is not complete or is under threat. Examples include missing components such as perennial forbs or cool season grasses, weed infestations, or lack of regeneration of key species such as sagebrush or cottonwoods trees.

Designated roads and trails. Specific roads and trails identified by the BLM where some type of motorized/nonmotorized use is appropriate and allowed, either seasonally or year-long (H-1601-I, BLM Land Use Planning Handbook).

Designation criteria (routes). Route designation criteria are described in 43 CFR 8342.

Desired future condition. For rangeland vegetation, the condition of rangeland resources on a landscape scale that meet management objectives. It is based on ecological, social, and economic considerations during the land planning process. It is usually expressed as ecological status or management status of vegetation (species composition, habitat diversity, and age and size class of species) and desired soil qualities (soil cover, erosion, and compaction). In a general context, desired future condition is a portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Desired conditions (Forest Service). A description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates.

Desired outcomes. A type of land use plan decision expressed as a goal or objective.

Direct impacts. Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place.

Directional drilling. A drilling technique whereby a well is deliberately deviated from the vertical in order to reach a particular part of the oil- or gas-bearing reservoir. Directional drilling technology enables the driller to steer the drill stem and bit to a desired bottom hole location. Directional wells initially are drilled straight down to a predetermined depth and then gradually curved at one or more different points to penetrate one or more given target reservoirs. This specialized drilling usually is accomplished with the use of a fluid-driven downhole motor, which turns the drill bit. Directional drilling also allows multiple production and injection wells to be drilled from a single surface location such as a gravel pad, thus minimizing cost and the surface impact of oil and gas drilling, production, and transportation facilities. It can be used to reach a target located beneath an environmentally sensitive area (Alaska Department of Natural Resources, Division of Oil and Gas 2009).

Disposal lands. Transfer of public land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act of 1926, Desert Land Entry or other land law statutes.

Disruptive activities. Those public land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to existing animal or human populations occurring at a specific location and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of individuals such that reproductive success is negatively affected, or an individual's physiological ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. When administered as a land use restriction (e.g., *No Disruptive Activities*), this term may prohibit or limit the physical presence of sound above ambient levels, light beyond background levels, and/or the nearness of people and their activities. The term is commonly used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, and birthing), although it could apply to any resource value on the public lands. The use of this land use restriction is not intended to prohibit all activity or authorized uses.

Distribution line. An electrical utility line with a capacity of less than 100 kilovolts or a natural gas, hydrogen, or water pipeline less than 24 inches in diameter.

Diversity. The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Drought. A prolonged chronic shortage of water, as compared to the norm, often associated with high temperatures and winds during spring, summer, and fall. A period without precipitation during which the soil water content is reduced to such an extent that plants suffer from lack of water (Bedell 1998).

Durability (protective and ecological). The administrative, legal, and financial assurances that secure and protect the conservation status of a compensatory mitigation site, and the ecological benefits of a compensatory mitigation project, for at least as long as the associated impacts persist.

Early brood-rearing habitat. Sagebrush habitat within the vicinity of the nest used by GRSG hens with chicks up to 3 weeks following hatch (Connelly et al. 2000a).

Easement. A right afforded a person or agency to make limited use of another's real property for access or other purposes.

Ecological Site. A distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Emergency stabilization. Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life and property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildland fire.

Endangered species. Any species that is in danger of extinction throughout all or a significant portion of its range. Under the Endangered Species Act in the US, "endangered" is the more-protected of the two categories. Designation as endangered (or threatened) is determined by USFWS as directed by the Endangered Species Act (16 USC 1531-1544).

Endangered Species Act of 1973 (as amended). Designed to protect critically imperiled species from extinction as a consequence of economic growth and development untempered by adequate concern and conservation. The Act is administered by two federal agencies, USFWS and the National Oceanic and Atmospheric Administration. The purpose of the Act is to protect species and also the ecosystems upon which they depend (16 US Code 1531-1544).

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet sage-grouse objectives.

Environmental assessment. A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. It includes a brief discussion of the need for the proposal, alternatives considered, environmental impact of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental impact statement (EIS). A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed (BLM National Management Strategy for OHV Use on Public Lands).

Evaluation (plan evaluation). The process of reviewing the land use plan and the periodic plan monitoring reports to determine whether the land use plan decisions and National Environmental Policy Act of 1969 analysis are still valid and whether the plan is being implemented.

Exchange. A transaction whereby the federal government receives land or interests in land in exchange for other land or interests in land.

Exclusion Areas. An area on the public lands where a certain activity(ies) is prohibited to insure protection of other resource values present on the site. The term is frequently used in reference to lands/realty actions and proposals (e.g., rights-of-way), but is not unique to lands and realty program activities. This restriction is functionally analogous to the phrase “no surface occupancy” used by the oil and gas program, and is applied as an absolute condition to those affected activities. The less restrictive analogous term is avoidance area. Also see “*right-of-way exclusion area*” definition.

Exemplary (vegetation). An area of vegetation that does not show signs of degradation and which may serve as a comparison to illustrate what the vegetation potential is for a given type of environment. Exemplary vegetation meets A-ranked viability criteria as described by the Colorado Natural Heritage Program.

Existing routes. Existing routes are defined as those routes on the ground that clearly show prior use to the extent that a clear path is visible with no vegetation on it, or in some cases little vegetation in the center of the travel path. A single set of vehicle tracks does not make an existing route.

Exploration. Active drilling and geophysical operations to:

- Determine the presence of the mineral resource; or
- Determine the extent of the reservoir or mineral deposit.

Extensive recreation management area (ERMA). Administrative units that require specific management consideration in order to address recreation use, demand, or Recreation and Visitor Services program investments. ERMA's are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. ERMA management is commensurate and considered in context with the management of other resources and resource uses.

Federal Land Policy and Management Act of 1976 (FLPMA). Public Law 94-579, October 21, 1976, often referred to as the BLM's “Organic Act,” which provides most of the BLM's legislated authority, direction policy, and basic management guidance.

Federal mineral estate. Subsurface mineral estate owned by the US and administered by the BLM. Federal mineral estate under BLM jurisdiction is composed of mineral estate underlying BLM lands, privately owned lands, and state-owned lands.

Fire frequency. A general term referring to the recurrence of fire in a given area over time.

Fire intensity. A general term relating to the heat energy released in a fire; the amount and rate of surface fuel consumption.

Fire management plan (FMP). A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans including, but not limited to, preparedness

plans, preplanned dispatch plans, and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Fire Regime Condition Classification System (FRCCS). Measures the extent to which vegetation departs from reference conditions, or how the current vegetation differs from a particular reference condition.

Fire severity. The effects of fire on ecological processes, soil, flora, and fauna; degree to which a community has been altered or disrupted by fire.

Fire suppression. All work and activities connected with control and fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fluid minerals. Oil, gas, coal bed natural gas, and geothermal resources.

Forage. All browse and herbaceous foods that are available to grazing animals.

Forage base. The amount of vegetation available for wildlife and livestock use.

Fragile soils. Soils having a shallow depth to bedrock, minimal surface layer of organic material, textures that are more easily detached and eroded, or are on slopes over 35 percent.

Fugitive dust. Significant atmospheric dust arises from the mechanical disturbance of granular material exposed to the air. Dust generated from these open sources is termed “fugitive” because it is not discharged to the atmosphere in a confined flow stream. Common sources of fugitive dust include unpaved roads, agricultural tilling operations, aggregate storage piles, and heavy construction operations.

Future Temporary Closures. Where off-road vehicles are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence. This may include closure of routes or areas (43 CFR 8341.2).

Geographic Information System (GIS). A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and display a potentially wide array of geospatial information.

Geophysical exploration. Efforts to locate deposits of oil and gas resources and to better define the subsurface.

Geothermal energy. Natural heat from within the Earth captured for production of electric power, space heating, or industrial steam.

General habitat management area (GHMA). BLM and FS lands identified requiring special management to sustain GRSB populations. The GHMAs are derived from and generally follow the PGH boundaries (see in Chapter 3) but may be modified in extent based on the objectives

of each alternative. Likewise, management strategies applied to the GHMAs may vary by alternative.

Goal. A broad statement of a desired outcome; usually not quantifiable and may not have established timeframes for achievement.

Grandfathered right. The right to use in a non-conforming manner due to existence prior to the establishment of conforming terms and conditions.

Grazing preference. Grazing preference or preference means a superior or priority position against others for the purpose of receiving a grazing permit or lease. This priority is attached to base property owned or controlled by the permittee or lessee. (43 CFR 4100.0-5).

Grazing system. Scheduled grazing use and non-use of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation. Include, but are not limited to, developing pastures, utilization levels, grazing rotations, timing and duration of use periods, and necessary range improvements.

Groundwater. Water held underground in soil or permeable rock, often feeding springs and wells.

Guidelines (BLM). Actions or management practices that may be used to achieve desired outcomes, sometimes expressed as BMPs. Guidelines may be identified during the land use planning process, but they are not considered a land use plan decision unless the plan specifies that they are mandatory. Guidelines for grazing administration must conform to 43 CFR 4180.2.

Guideline (Forest Service). A constraint on project and activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Habitat. An environment that meets a specific set of physical, biological, temporal, or spatial characteristics that satisfy the requirements of a plant or animal species or group of species for part or all of their life cycle.

Hazardous material. A substance, pollutant, or contaminant that, due to its quantity, concentration, or physical or chemical characteristics, poses a potential hazard to human health and safety or to the environment if released into the workplace or the environment.

High-Voltage Transmission Line. A transmission line that is greater than or equal to 100 kv.

Impact. The effect, influence, alteration, or imprint caused by an action.

Impairment. The degree to which a distance of clear visibility is degraded by man-made pollutants.

Implementation decisions. Decisions that take action to implement land use planning; generally appealable to Interior Board of Land Appeals under 43 CFR 4.410.

Implementation plan. An area or site-specific plan written to implement decisions made in a land use plan. Implementation plans include both activity plans and project plans.

Indicators. Factors that describe resource condition and change and can help the BLM and Forest Service determine trends over time.

Indirect impacts. Indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur.

Integrated Pest Management. A sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks.

Intermittent stream. An intermittent stream is a stream that flows only at certain times of the year when it receives water from springs or from some surface sources such as melting snow in mountainous areas. During the dry season and throughout minor drought periods, these streams will not exhibit flow. Geomorphological characteristics are not well defined and are often inconspicuous. In the absence of external limiting factors, such as pollution and thermal modifications, species are scarce and adapted to the wet and dry conditions of the fluctuating water level.

Invertebrate. An animal lacking a backbone or spinal column, such as insects, snails, and worms.

Key wildlife ecosystems. Specific areas within the geographic area occupied by a species in which are found those physical and biological features that are: 1) essential to the conservation of the species, and 2) which may require special management considerations or protection.

Landscape scale. A distinct association of land types that exhibit a unique combination of local climate, landform, topography, geomorphic process, surficial geology, soil, biota, and human influences. Landscapes are generally of a size that the eye can comprehend in a single view.

Land health condition. A classification for land health which includes two categories: Meeting Land Health Standard(s) and Not Meeting Land Health Standard(s).

- Meeting Land Health Standard(s): Lands for which health indicators are currently in acceptable condition such that basic levels of ecological processes and functions are in place. This rating includes the following subcategories:
 - Fully Meeting Standard(s): Lands for which there are no substantive concerns with health indicators
 - Exceeding Standard(s): Lands for which health indicators are in substantially better conditions than acceptable levels.
 - Meeting Standard(s) with Problems: Lands which have one or more concerns with health indicators to the degree that they are categorized as meeting the Land Health Standards, but have some issues which make them at risk of becoming “not meeting.”

- **Not Meeting Land Health Standard(s):** Lands for which one or more health indicators are in unacceptable conditions such that basic levels of ecological processes and functions are no longer in place.

Land health trend. Used to describe land health condition further. It includes the following categories: upward, static, and downward.

- **Upward Trend:** lands which have shown improving indicator conditions over time.
- **Static Trend:** lands which have shown no clear improvement or decline in indicator conditions over time.
- **Downward Trend:** lands which have shown declining indicator conditions over time.

Land tenure adjustments. Land ownership or jurisdictional changes. To improve the manageability of the BLM lands and their usefulness to the public, the BLM has numerous authorities for repositioning lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land pattern improvements are completed primarily through the use of land exchanges but also through land sales, through jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases.

Landownership adjustment. Land adjustments to National Forest System lands by purchase, exchange, interchange, or conveyance under authority delegated by law to the Secretary of Agriculture.

Land treatment. All methods of artificial range improvement and soil stabilization such as reseeding, brush control (chemical and mechanical), pitting, furrowing, and water spreading.

Land use allocation. The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions (H-1601-I, BLM Land Use Planning Handbook).

Land Use Authorization. Specific to lands and realty actions, includes those land uses authorized under 43 CFR 2800 and 43 CFR 2900, which include short-and long-term permits, ROWs, and leases.

Land use plan. A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land use plan level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. The term includes both RMPs and management framework plans (from H-1601-I, BLM Land Use Planning Handbook).

Land use plan decision. Establishes desired outcomes and actions needed to achieve them. Decisions are reached using the planning process in 43 CFR 1600. When they are presented to the public as proposed decisions, they can be protested to the BLM Director. They are not appealable to Interior Board of Land Appeals.

Large Pipeline. A pipeline that is 24 inches or greater in diameter.

Late brood-rearing habitat. Habitats used by GRSG following desiccation of herbaceous vegetation in sagebrush uplands (Fischer et al. 1996). Late brood-rearing habitats include mesic sagebrush and mixed shrub communities, wet meadows, and riparian habitats as well as some agricultural lands (e.g., alfalfa fields). These habitats are generally used from July to early September but vary annually due to annual weather conditions (Connelly et al. 1988).

Leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. These include energy-related mineral resources such as oil, natural gas, coal, and geothermal, and some non-energy minerals, such as phosphate, sodium, potassium, and sulfur. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

Lease. Section 302 of the Federal Land Policy and Management Act of 1976 provides the BLM's authority to issue leases for the use, occupancy, and development of public lands. Leases are issued for purposes such as a commercial filming, advertising displays, commercial or noncommercial croplands, apiaries, livestock holding or feeding areas not related to grazing permits and leases, native or introduced species harvesting, temporary or permanent facilities for commercial purposes (does not include mining claims), residential occupancy, ski resorts, construction equipment storage sites, assembly yards, oil rig stacking sites, mining claim occupancy if the residential structures are not incidental to the mining operation, and water pipelines and well pumps related to irrigation and nonirrigation facilities. The regulations establishing procedures for processing these leases and permits are found in 43 CFR 2920.

Lease. A type of special use authorization (usually granted for uses other than linear rights-of-way) that is used when substantial capital investment is required and when conveyance of a conditional and transferable interest in National Forest System lands is necessary or desirable to serve or facilitate authorized long-term uses, and that may be revocable and compensable according to its terms.

Lease stipulation. A modification of the terms and conditions on a standard lease form at the time of the lease sale.

Lessee. A person or entity authorized to use and occupy National Forest System land under a specific instrument identified as a lease. Forest special use leases are limited to authorize certain wireless communication uses. Leases are also used for certain mineral leasable activities.

Lek. A traditional courtship display area attended by male sage-grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male sage-grouse engaged in courtship displays. Sub-dominant males may display on itinerant strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where less than five males are observed strutting should be confirmed active for two years before meeting the definition of a lek (Connelly et al. 2000; Connelly et al. 2003, 2004). Each state may have a slightly different definition of lek, active lek, inactive lek, occupied lek, and unoccupied leks. Regional planning will use the appropriate definition provided by the state of interest.

- **Abandoned Lek.** A lek in otherwise suitable habitat that has not been active during a period of 10 consecutive years. To be designated abandoned, a lek must be “inactive” (see above criteria) in at least four non-consecutive strutting seasons spanning the 10 years. The site of an “abandoned” lek should be surveyed at least once every 10 years to determine whether it has been re-occupied by sage-grouse.
- **Active Lek.** Any lek that has been attended by 2 or more males at least twice in the last 5 years.
- **Destroyed Lek.** A formerly active lek site and surrounding sagebrush habitat that has been destroyed and is no longer suitable for GRSG breeding.
- **Historic Lek.** Any lek that has been attended by 0 or 1 male during every visit (minimum 5 visits) in the last 30 years.
- **Inactive Lek.** Any lek where sufficient data suggests that there 0 or 1 male during every visit (minimum 2 visits) in the last 5 years.
- **Occupied Lek.** A lek that has been active during at least one strutting season within the prior 10 years.
- **Pending Active Lek.** Any lek that has been attended by 2 or more males only once in the last 5 years.
- **Unoccupied Lek.** A lek that has either been “destroyed” or “abandoned.”

Lek complex. A lek or group of leks within 2.5 kilometers (1.5 miles) of each other between which male GRSG may interchange from one day to the next. Fidelity to leks has been well documented. Visits to multiple leks are most common among yearlings and less frequent for adult males, suggesting an age-related period of establishment (Connelly et al. 2004).

Lentic. Pertaining to standing water, such as lakes and ponds.

Limited Area. An area restricted at certain times, in certain areas, and/or to certain vehicular use. These restrictions may be of any type but can generally be accommodated within the following type of categories: numbers of vehicles; types of vehicles; time or season of vehicle use; permitted or licensed use only; use on existing roads and trails; use on designated roads and trails; and other restrictions (43 CFR 8340.0-5(g)).

Locatable minerals. Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Act of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

Long-term effect. The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more.

Lotic. Pertaining to moving water, such as streams or rivers.

Management decision. A decision made by the BLM to manage public lands. Management decisions include both land use plan decisions and implementation decisions.

Master Development Plans. A set of information common to multiple planned wells, including drilling plans, Surface Use Plans of Operations, and plans for future production.

Mechanized transport. Any vehicle, device, or contrivance for moving people or material in or over land, water, snow, or air that has moving parts.

Mesic (shrub condition). Sites with mean annual precipitation of greater than or equal to 10 inches (25.4 centimeters).

Mineral. Any naturally formed inorganic material, solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), and salable (subject to the Materials Act of 1947).

Mineral entry. The filing of a claim on public land to obtain the right to any locatable minerals it may contain.

Mineral estate. The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mineralize. The process where a substance is converted from an organic substance to an inorganic substance.

Mineral materials. Common varieties of mineral materials such as soil, sand and gravel, stone, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws but that can be acquired under the Materials Act of 1947, as amended.

Minimization mitigation. Minimizing impacts by limiting the degree or magnitude of the action and its implementation (40 CFR 1508.20 (b)).

Mining claim. A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, millsite, and tunnel site.

Mining Law of 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the “General Mining Laws” or “Mining Laws.”

Mitigation. Includes specific means, measures or practices that could reduce, avoid, or eliminate adverse impacts. Mitigation can include avoiding the impact altogether by not taking a certain action or parts of an action, minimizing the impact by limiting the degree of magnitude of the action and its implementation, rectifying the impact by repairing, rehabilitation, or restoring the affected environment, reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and compensating for the impact by replacing or providing substitute resources or environments.

Modification. A fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied..

Monitoring (plan monitoring). The process of tracking the implementation of land use plan decisions and collecting and assessing data necessary to evaluate the effectiveness of land use planning decisions.

Motorized vehicles or uses. Vehicles that are motorized, including but not limited to jeeps, all-terrain vehicles (all-terrain vehicles, such as four-wheelers and three-wheelers), trail motorcycles or dirt bikes, and aircrafts.

Multiple-use. The management of the public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output (FLPMA) (BLM Manual 6840, Special Status Species Manual).

Municipal watershed. A watershed area that provides water for use by a municipality as defined by the community and accepted by the State.

National Conservation Area. Area designated by Congress, generally, to conserve, protect, enhance, and properly manage the resources and values for which it was designated for the benefit and enjoyment of present and future generations (BLM Manual 6220).

National Environmental Policy Act of 1969 (NEPA). Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Historic Trail. A congressionally designated trail that is an extended, long-distance trail, not necessarily managed as continuous, that follows as closely as possible and practicable the original trails or routes of travel of national historic significance. The purpose of a National Historic Trail is the identification and protection of the historic route and the historic remnants and artifacts for public use and enjoyment. A National Historic Trail is managed in a manner to protect the nationally significant resources, qualities, values, and associated settings of the areas through which such trails may pass, including the primary use or uses of the trail (BLM Manual 6250, NHT Administration).

National Register of Historic Places. A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance established by the Historic Preservation Act of, 1966 and maintained by the National Park Service.

Native vegetation. Plant species which were found here prior to European settlement, and consequently are in balance with these ecosystems because they have well developed parasites, predators, and pollinators.

Natural processes. Fire, drought, insect and disease outbreaks, flooding, and other events which existed prior to European settlement, and shaped vegetation composition and structure.

Net conservation gain. The actual benefit or gain above baseline conditions.

No longer in use. Prior authorizations containing antiquated infrastructure no longer being utilized by ROW or leaseholder; expired ROWs, 2900 permits and R&PP lease cases; or other previously approved uses that no longer have authorizations.

Non-energy leasable minerals. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. Non-energy minerals include resources such as phosphate, sodium, potassium, and sulfur.

Non-habitat. Areas outside of mapped GRSG habitats (PHMA, GHMA, and OHMA) which do not contain suitable habitat for GRSG life-history requirements.

Non-habitat (NV State Plan). Areas identified through the habitat suitability index (Section 6.0) with index values less than 1.5 standard deviations below the mean value of the index. These areas are identified as generally not meeting the needs for GRSG to survive and reproduce.

Non-structural range improvement. Range improvements including seedings, vegetation treatments, herbicide application, and prescribed fire.

Nonfunctional condition. Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or woody debris to dissipate energies associated with flow events, and thus are not reducing erosion, and improving water quality.

No surface occupancy (NSO). A major constraint where use or occupancy of the land surface for fluid mineral exploration or development and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes and construction of wells and/or pads) are prohibited to protect identified resource values. Areas identified as NSO are open to fluid mineral leasing, but surface occupancy or surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area.

Noxious weeds. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the US.

Objective (BLM). A description of a desired outcome for a resource. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

Objective (Forest Service). A concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.

Off-highway vehicle (OHV) (off-road vehicle). Any motorized vehicle capable of, or designated for travel on or immediately over land, water or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense emergencies (43 CFR 8340.0-5).

Off-highway vehicle (OHV) (off-road vehicle) Area Plan Decision. Routes within PHMA would be limited to existing roads, primitive roads, and trails. The OHV designation would change from “limited to existing roads, primitive roads, and trails” to “limited to designated roads, primitive, roads, and trails” upon the completion of travel management plans.

Open. Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs. For example, 43 CFR 8340.0-5 defines the specific meaning of “open” as it relates to OHV use.

Ozone. A faint blue gas produced in the atmosphere from chemical reactions of burning coal, gasoline, and other fuels and chemicals found in products such as solvents, paints, and hairsprays.

Paleontological resources. The physical remains or other physical evidence of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for correlating and dating rock strata and for understanding past environments, environmental change, and the evolution of life.

Particulate matter (PM). One of the six “criteria” pollutants for which the US EPA established National Ambient Air Quality Standards. Particulate matter is defined as two categories, fine particulates, with an aerodynamic diameter of 10 micrometers (PM₁₀) or less, and fine particulates with an aerodynamic diameter of 2.5 micrometers or less (PM_{2.5}).

Perennial stream. A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Permitted use. The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and expressed in AUMs (43 CFR 4100.0-5) (from H-4180-1, BLM Rangeland Health Standards Manual).

Permittee. A person or company permitted to graze livestock on public land.

Phase I Conifer Encroachment. Trees are present on the site, but the shrub and herb layer are the dominant influence on ecological processes (hydrologic, nutrient, and energy cycles). Tree canopy cover of less than 10 percent (Miller et. al. 2005).

Phase II Conifer Encroachment. Trees are co-dominant with shrub and herb layers. All three layers influence ecological processes. Tree canopy cover of 10 to 30 percent (Miller et. al. 2005).

Phase III Conifer Encroachment. Trees are the dominant vegetation and the primary layer influencing ecological processes. Tree canopy cover of greater than 30 percent (Miller et. al. 2005).

Physiography. The study and classification of the surface features of the earth.

Plan of Operations. A Plan of Operations is required for all mining activity exploration greater than 5 acres or surface disturbance greater than casual use on certain special category lands. Special category lands are described under 43 CFR 3809.11(c) and include such lands as designated Areas of Critical Environmental Concern, lands within the National Wilderness Preservation System, and areas closed to off-road vehicles, among others. In addition, a plan of operations is required for activity greater than casual use on lands patented under the Stock Raising Homestead Act with Federal minerals where the operator does not have the written consent of the surface owner (43 CFR 3814). The Plan of operations needs to be filed in the BLM field office with jurisdiction over the land involved. The Plan of Operations does not need to be on a particular form but must address the information required by 43 CFR 3809.401(b).

Planning area. The geographical area for which resource management plans are developed and maintained. The Nevada and Northeastern California Greater Sage-Grouse RMPA/EIS planning area boundary includes public lands managed by the United States Department of the Interior, Bureau of Land Management, within five BLM Districts in Nevada (Battle Mountain, Carson City, Elko, Ely, and Winnemucca) and three BLM Field Offices in California (Alturas, Eagle Lake, and Surprise), as well as public lands managed by the US Department of Agriculture, Forest Service, Humboldt-Toiyabe National Forest. The planning area boundary includes all lands regardless of jurisdiction.

Planning criteria. The standards, rules, and other factors developed by managers and interdisciplinary teams for their use in forming judgments about decision making, analysis, and data collection during planning. Planning criteria streamlines and simplifies the resource management planning actions.

Planning issues. Concerns, conflicts, and problems with the existing management of public lands. Frequently, issues are based on how land uses affect resources. Some issues are

concerned with how land uses can affect other land uses, or how the protection of resources affects land uses.

Policy. This is a statement of guiding principles, or procedures, designed and intended to influence planning decisions, operating actions, or other affairs of the BLM or Forest Service. Policies are established interpretations of legislation, executive orders, regulations, or other presidential, secretarial, or management directives.

Population Management Unit (PMU). GRSG areas delineated based on aggregations of GRSG lek locations where the potential for genetic interchange (short-term) among populations is high.

Preliminary general habitat (PGH). Is occupied (seasonal or year-round) habitat outside of priority habitat. These areas have been identified by the BLM and Forest Service in coordination with respective state wildlife agencies.

Preliminary priority habitat (PPH). Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations; include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by the BLM and Forest Service in coordination with respective state wildlife agencies.

Prescribed fire. Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist and NEPA requirements, where applicable, must be met before ignition. **Primitive Road.** A linear route managed for use by four-wheel drive or high-clearance vehicles. These routes do not customarily meet any BLM road design standards.

Primitive route. Any transportation linear feature located within areas that have been identified as having wilderness characteristics and not meeting the wilderness inventory road definition (BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands).

Priority habitat management area (PHMA). BLM and FS lands identified to be managed as having the highest value to maintaining sustainable GRSG populations. The PHMAs are derived from and generally follow the PPH boundaries (see in Chapter 3) but may be modified in extent based on the objectives of each alternative. Likewise, management strategies applied to the PHMAs may vary by alternative.

Prohibit. To forbid (something) by law, rule, or other authority; no authorizations will be issued.

Restrict. To put a limit on; keep under control; to limit someone's actions or movement, or to limit the amount or size of something.

Project area. The Nevada and Northeastern California Greater Sage-Grouse RMPA/EIS planning area boundary includes public lands managed by the BLM, within the five BLM Districts in Nevada (Battle Mountain, Carson City, Elko, Ely, and Winnemucca) and three BLM Field

Offices in California (Alturas, Eagle Lake, and Surprise), as well as public lands managed by the Forest Service, Humboldt-Toiyabe National Forest.

Proper functioning condition. A term describing stream health that is based on the presence of adequate vegetation, landform and debris to dissipate energy, reduce erosion and improve water quality.

Public domain. The term applied to any or all of those areas of land ceded to the Federal Government by the Original States and to such other lands as were later acquired by treaty, purchase or cession, and are disposed of only under the authority of Congress.

Public land. Land or interest in land owned by the US and administered by the Secretary of the Interior through the BLM without regard to how the US acquired ownership, except lands located on the Outer Continental Shelf and land held for the benefit of Indians, Aleuts, and Eskimos (H-1601-I, BLM Land Use Planning Handbook).

Range Improvement. The term range improvement means any activity, structure or program on or relating to rangelands which is designed to improve production of forage; change vegetative composition; control patterns of use; provide water; stabilize soil and water conditions; and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results.

Range improvement project. An authorized physical modification or treatment which is designed to improve production of forage; change vegetation composition; control patterns of use; provide water; stabilize soil and water conditions; restore, protect and improve the condition of rangeland ecosystems to benefit livestock, wild horses and burros, and fish and wildlife. This definition includes, but is not limited to: structures, treatment projects and use of mechanical devices, or modifications achieved through mechanical means.

Raptor. Bird of prey with sharp talons and strongly curved beaks, such as hawks, owls, falcons, and eagles.

Reasonable foreseeable development scenario (RFDs). The prediction of the type and amount of oil and gas activity that would occur in a given area. The prediction is based on geologic factors, past history of drilling, projected demand for oil and gas, and industry interest.

Reclamation. The suite of actions taken within an area affected by human disturbance, the outcome of which is intended to change the condition of the disturbed area to meet pre-determined objectives and/or make it acceptable for certain defined resources (e.g., wildlife habitat, grazing, or ecosystem function).

Recreation management area. Includes special recreation management areas (SRMAs) and extensive recreation management areas (ERMAs); see SRMA and ERMA definitions.

Recreation experiences. Psychological outcomes realized either by recreation-tourism participants as a direct result of their on-site leisure engagements and recreation-tourism

activity participation or by nonparticipating community residents as a result of their interaction with visitors and guests within their community or interaction with the BLM or Forest Service and other public and private recreation-tourism providers and their actions.

Recreation opportunities. Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and attain more lasting, value-added beneficial outcomes.

Recreation settings. The collective distinguishing attributes of landscapes that influence and sometimes actually determine what kinds of recreation opportunities are produced.

Reference State. The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are performing at an optimum level under the natural disturbance regime. This state usually includes, but is not limited to, what is often referred to as the potential natural plant community.

Rehabilitate. Returning disturbed lands as near to its predisturbed condition as is reasonably practical or as specified in approved permits.

Rehabilitation. Efforts undertaken within three years of containment of a wildland fire to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire.

Renewable Energy. Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro, and biomass. Although particular geothermal formations can be depleted, the natural heat in the Earth is a virtually inexhaustible reserve of potential energy.

Required Design Features (RDF). Means, measures, or practices intended to reduce or avoid adverse environmental impacts. A suite of features that would establish the minimum specifications for certain activities (i.e., water developments, mineral development, and fire and fuels management) and mitigate adverse impacts. These design features would be required to provide a greater level of regulatory certainty than through implementation of Best Management Practices. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known. Because of site-specific circumstances, some features may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations from what is described in the LUPA/EIS (e.g., a larger or smaller protective area). All variations in design features would require appropriate analysis and disclosure as part of future project authorizations. Additional mitigation measures may be identified and required during individual project development and environmental review.

Reserve Common Allotment. A reserve common allotment is an area which is designated in the land use plan as available for livestock grazing but reserved as an area available for use as an alternative to grazing in another allotment in order to facilitate rangeland restoration treatments and recovery from natural disturbances such as drought or wildfire. The reserve common

allotment would provide needed flexibility that would help the agency apply temporary rest from grazing where vegetation treatments and/or management would be most effective.

Residual impacts. Impacts from an authorized land use that remain after applying avoidance and minimization mitigation; also referred to as unavoidable impacts.

Resilience. The capacity of an ecosystem to regain its fundamental structure, processes, and functioning when subjected to stressors or disturbances such as drought, livestock grazing, or wildfire. In this context, resilience is a function of the underlying ecosystem attributes and processes that determine ecosystem recovery rather than the amount or magnitude of stress or disturbance that an ecosystem can withstand before changes in attributes and processes result in new alternative states.

Resistance. The capacity of an ecosystem to retain its fundamental structure, processes, and functioning (or remain largely unchanged) despite stressors or disturbances.

Resistance to invasives. The abiotic and biotic attributes and ecological processes of an ecosystem that limit the population growth of an invading species.

Resource management plan (RMP). A land use plan as prescribed by the Federal Land Policy and Management Act that establishes, for a given area of land, land-use allocations, coordination guidelines for multiple-use, objectives, and actions to be achieved.

Restore/restoration. Implementation of passive or active management actions designed to increase or maintain perennial herbaceous species and landscape cover of sagebrush so that plant communities are more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Restriction/restricted use. A limitation or constraint on public land uses and operations. Restrictions can be of any kind, but most commonly apply to certain types of vehicle use, temporal and/or spatial constraints, or certain authorizations.

Revegetate/revegetation. The process of putting vegetation back in an area where vegetation previously existed, which may or may not simulate natural conditions.

Revision. The process of completely rewriting the land use plan due to changes in the planning area affecting major portions of the plan or the entire plan.

Right-of-way (ROW). An authorization to use a specific piece of public land for a certain project, such as roads, pipelines, transmission lines, or communication sites. A ROW grant authorizes rights and privileges for a specific use of the land for a specific period of time. Other land use authorizations such as easements, leases, permits, or licenses are also categorized under rights-of-ways for this document.

Major ROW. A ROW that includes high voltage transmission lines (above 100 kV) or major pipelines (greater than 24 inches).

Minor ROW. A ROW that includes transmission lines below 100 kV or pipelines less than 24 inches in diameter. This also includes leases and permit authorizations covered under the Lands and Realty program.

Right-of-way avoidance area. An area identified through resource management planning to be avoided but may be available for ROW, lease and permit location with special stipulations.

Right-of-way exclusion area. An area identified through resource management planning that is not available for ROW, lease and permit location under any conditions.

Riparian area. A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.

Riparian zone. An area one-quarter mile wide encompassing riparian and adjacent vegetation.

Road. A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

Road or trail (Forest Service). A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and use of the National Forest System and the use and development of its resources.

Rotation. Grazing rotation between pastures in the allotment for the permitted time.

Routes. Multiple roads, trails and primitive roads; a group or set of roads, trails, and primitive roads that represents less than 100 percent of the BLM transportation system. Generically, components of the transportation system are described as “routes.”

Sale (public land). A method of land disposal pursuant to Section 203 of FLPMA, whereby the US receives a fair-market payment for the transfer of land from federal ownership. Public lands determined suitable for sale are offered on the initiative of the BLM. Lands suitable for sale must be identified in the RMP. Any lands to be disposed of by sale that are not identified in the current RMP, or that meet the disposal criteria identified in the RMP, require a plan amendment before a sale can occur.

Saturated soils. Occur when the infiltration capacity of the soil is exceeded from above due to rainfall or snowmelt runoff. Soils can also become saturated from groundwater inputs.

Scenic byways. Highway routes that have roadsides or corridors of special aesthetic, cultural, or historical value. An essential part of the highway is its scenic corridor. The corridor may contain outstanding scenic vistas, unusual geologic features, or other natural elements.

Scoping process. An early and open public participation process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

Season of use. The time during which livestock grazing is permitted on a given range area, as specified in the grazing lease.

Seeding. Seeding is a vegetation treatment that includes the application of grass, forb, or shrub seed, either aerially or from the ground. In areas of gentle terrain, ground applications of seed are often accomplished with a rangeland drill. Seeding allows the establishment of native species or placeholder species and restoration of disturbed areas to a perennial-dominated cover type, thereby decreasing the risk of subsequent invasion by exotic plant species. Seeding would be used primarily as a follow-up treatment in areas where disturbance or the previously described treatments have removed exotic plant species and their residue.

Short-term effect. The effect occurs only during or immediately after implementation of the alternative.

Special recreation management area (SRMA). An administrative public lands unit identified in land use plans where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.

Special recreation permit (SRP). Authorization that allows for recreational uses of public lands and related waters. Issued as a means to control visitor use, protect recreational and natural resources, and provide for the health and safety of visitors. Commercial SRPs are also issued as a mechanism to provide a fair return for the commercial use of public lands.

Special status species. BLM special status species are: (1) species listed, candidate, or proposed for listing under the Endangered Species Act; and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the Endangered Species Act that are designated as BLM sensitive by the BLM State Director(s). All federally listed candidate species, proposed species, and delisted species in the five years following delisting are conserved as BLM sensitive species. Forest Service special status species are: federally listed threatened and endangered species, designated by the USFWS under the ESA; sensitive species, designated by the Regional Forester with each Forest Service region; and management indicator species, designated for each forest unit within the individual forest and grassland plans during the planning process.

Split estate. This is the circumstance where the surface of a particular parcel of land is owned by a different party than the minerals underlying the surface. Split estates may have any combination of surface/subsurface owners: federal/state; federal/private; state/private; or percentage ownerships. When referring to the split estate ownership on a particular parcel of land, it is generally necessary to describe the surface/subsurface ownership pattern of the parcel.

Stabilize. The process of stopping further damage from occurring.

Standard (BLM). A description of the physical and biological conditions or degree of function required for healthy, sustainable lands (e.g., land health standards). To be expressed as a desired outcome (goal).

Standard (Forest Service). A mandatory constraint on project and activity decision making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Standard lease terms and conditions. Areas may be open to leasing with no specific management decisions defined in a Resource Management Plan; however, these areas are subject to lease terms and conditions as defined on the lease form (Form 3100-11, Offer to Lease and Lease for Oil and Gas; and Form 3200-24, Offer to Lease and Lease for Geothermal Resources).

State. A state is comprised of an integrated soil and vegetation unit having one or more biological communities that occur on a particular ecological site and that are functionally similar with respect to the three attributes (soil/site stability, hydrologic function, and biotic integrity) under natural disturbance regimes.

Strongholds. Areas having the highest densities of GRSB populations and other habitat criteria important for their persistence (USFWS 2014).

Stipulation (general). A term, condition or requirement that is specified in an agreement or contract.

Stipulation (oil and gas). A provision that modifies standard oil and gas lease terms and conditions in order to protect other resource values or land uses and is attached to and made a part of the lease. Typical lease stipulations include No Surface Occupancy (NSO), Timing Limitations (TL), and Controlled Surface Use (CSU). Lease stipulations are developed through the land use planning (RMP) process.

Suitable River. An eligible river segment found through administrative study to meet the criteria for designation as a component of the National Wild and Scenic Rivers System, as specified in Section 4(a) of the Wild and Scenic Rivers Act (BLM Manual 6400, Wild and Scenic Rivers).

Surface-disturbing activities. An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other public land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire). Surface disturbing activities may be either authorized or prohibited.

Surface use(s). These are all the various activities that may be present on the surface or near-surface (e.g., pipelines), of the public lands. It does not refer to those subterranean activities

(e.g., underground mining) occurring on the public lands or federal mineral estate. When administered as a use restriction (e.g., *No Surface Use [NSU]*), this phrase prohibits all but specified resource uses and activities in a certain area to protect particular sensitive resource values and property. This designation typically applies to small acreage sensitive resource sites (e.g., plant community study enclosure), and/or administrative sites (e.g., government ware-yard) where only authorized, agency personnel are admitted.

Sustained yield. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple uses.

Technically Feasible. Actions that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. It is the BLM's and Forest Service's sole responsibility to determine what actions are technically and economically feasible. The BLM and the Forest Service will consider whether implementation of the proposed action is likely given past and current practice and technology; this consideration does not necessarily require a cost-benefit analysis or speculation about an applicant's costs and profit (Modified from the CEQ's 40 Most Asked Questions).

Temporary/temporary use. A relative term that must be considered in the context of the resource values affected and the nature of the resource use(s)/activity(ies) taking place. Generally, a temporary activity is considered to be one that is not fixed in place and is of short duration.

Temporary special use permit (Forest Service). A type of permit that terminates within 1 year or less after the approval date. All other provisions applicable to permits apply fully to temporary permits. Temporary special use permits are issued for seasonal or short-duration uses involving minimal improvement and investment.

Terrestrial. Living or growing in or on the land.

Threatened species. Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range Under the Endangered Species Act in the US, "threatened" is the lesser-protected of the two categories. Designation as threatened (or endangered) is determined by USFWS as directed by the Endangered Species Act (16 US Code 1531-1544).

Timber. Standing trees, downed trees, or logs which are capable of being measured in board feet.

Timeliness. The conservation benefits from compensatory mitigation accruing as early as possible or before impacts have begun.

Timing Limitation (TL). The TL stipulation, a moderate constraint, is applicable to fluid mineral leasing, all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads), and other surface-disturbing activities (i.e., those not related to fluid mineral leasing). Areas

identified for TL are closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames. This stipulation does not apply to operation and basic maintenance activities, including associated vehicle travel, unless otherwise specified. Construction, drilling, completions, and other operations considered to be intensive in nature are not allowed. Intensive maintenance, such as workovers on wells, is not permitted. TLs can overlap spatially with NSO and CSU, as well as with areas that have no other restrictions.

Total dissolved solids. Salt, or an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

Total maximum daily load. An estimate of the total quantity of pollutants (from all sources: point, nonpoint, and natural) that may be allowed into waters without exceeding applicable water quality criteria.

Trail. A linear route managed for human-power (e.g., hiking or bicycling), stock (e.g., equestrian), or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Transition. A shift between two states. Transitions are not reversible by simply altering the intensity or direction of factors that produced the change. Instead, they require new inputs such as revegetation or shrub removal. Practices, such as these, that accelerate succession are often expensive to apply.

Transmission. The movement or transfer of electric energy over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers, or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transmission line. An electrical utility line with a capacity greater than or equal to 100kV or a natural gas, hydrogen, or water pipeline greater than or equal to 24 inches in diameter.

Transportation system. The sum of the BLM's recognized inventory of linear features (roads, primitive roads, and trails) formally recognized, designated, and approved as part of the BLM's transportation system.

Travel management areas. Polygons or delineated areas where a rational approach has been taken to classify areas open, closed or limited, and have identified and/or designated a network of roads, trails, ways, landing strips, and other routes that provide for public access and travel across the planning area. All designated travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or timeframes for allowable access or other limitations (BLM Handbook H-1601-I, Land Use Planning Handbook).

Travel management system. Planned and authorized roads, trails, and areas for motor vehicle use on National Forest System lands that are managed in a controlled, sustained manner.

Trespass. Any unauthorized use of public land.

Tribal interests. Native American or Native Alaskan economic rights such as Indian trust assets, resource uses and access guaranteed by treaty rights, and subsistence uses.

Understory. That portion of a plant community growing underneath the taller plants on the site.

Unitization. Operation of multiple leases as a single lease under a single operator.

Utility corridor. A designated parcel of land that is either linear or areal in character. Utility corridors are not usually wider than five miles; are limited by technological, environmental, and topographical factors; and are set in width as identified by the special use permit or right-of-way issued. Designation criteria are set forth in Section 503 of FLPMA for special use permits and rights-of-way; and 43 CFR 2802.11 for rights-of-way.

Utility-Scale. An electrical generation facility capable of producing 20 megawatts or more of electricity.

Valid existing rights. Documented, legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include but are not limited to fee title ownership, mineral rights, rights-of-way, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Vegetation manipulation. Planned alteration of vegetation communities through use of mechanical, chemical, seeding, and/or prescribed fire or managed fire to achieve desired resource objectives.

Vegetation treatments. Management practices which change the vegetation structure to a different stage of development. Vegetation treatment methods include managed fire, prescribed fire, chemical, mechanical, and seeding.

Vegetation type. A plant community with immediately distinguishable characteristics based upon and named after the apparent dominant plant species.

Visibility (air quality). A measure of the ability to see and identify objects at different distances.

Visitor day. Twelve visitor hours that may be aggregated by one or more persons in single or multiple visits.

Visual resources. The visible physical features on a landscape, (topography, water, vegetation, animals, structures, and other features) that comprise the scenery of the area.

WAFWA Management Zones (MZ). Delineation of GRSG management zones which were determined by GRSG populations and sub-populations identified within seven floristic provinces

(Connelly et al. 2004). Floristic provinces reflect ecological and biological issues and similarities, not political boundaries.

Warranted but precluded. When the public files a petition with USFWS to have a species listed under the Endangered Species Act, the USFWS can make one of three findings: listing is warranted; listing is not warranted; or listing is warranted but precluded. The warranted by precluded listing indicates that a species should be listed based on the available science, but listing other species takes priority because they are more in need of protection.

Watershed. Topographical region or area delineated by water draining to a particular watercourse or body of water.

West Nile virus. A virus that is found in temperate and tropical regions of the world and most commonly transmitted by mosquitos. West Nile virus can cause flu-like symptoms in humans and can be lethal to birds, including GRSG.

Wildcat well. An exploratory oil well drilled in land not known to be an oil field.

Wilderness. A congressionally designated area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected mainly by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres or is large enough to make practical its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value. The definition is contained in Section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

Wilderness characteristics. Wilderness characteristics attributes include the area's size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in section 2(c) of the Wilderness Act.

Wilderness Study Area (WSA). A designation made through the land use planning process of a roadless area found to have wilderness characteristics, as described in Section 2(c) of the Wilderness Act of 1964.

Wildfires. Unplanned ignitions or prescribed fires that are declared wildfires. Wildfires may be managed to meet one or more objectives as specified in the Resource Management Plan, and these objectives can change as the fire spreads across the landscape (NWCG #024-2010 Memorandum, April 30, 2010).

Wildland fire. Wildland fire is a general term describing any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:

- Wildfires: Unplanned ignitions or prescribed fires that are declared wildfires.

- Prescribed fires: Planned ignitions.
- Uncharacteristic wildfire: fire processes occurring outside their historical natural fire regime.

Wildfire suppression. An appropriate management response to wildfire, escaped wildland fire use, or prescribed fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire.

Wildland fire use. A term no longer used; these fires are now included within the “Wildfire” definition.

Wildland-urban interface (WUI). The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Withdrawal. An action that restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws. Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.

Winter concentration areas. Sage-grouse winter habitats which are occupied annually by sage-grouse and provide sufficient sagebrush cover and food to support birds throughout the entire winter (especially periods with above average snow cover). Many of these areas support several different breeding populations of sage-grouse. Sage-grouse typically show high fidelity for these areas, and loss or fragmentation can result in significant population impacts.

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